The Builder.

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The Engineering of War.

TWO thousand and eighty-six years ago, Hannibal, the greatest general of antiquity, crossed, first the Pyrenees, and then the Alps, and poured his African troops on the plains of Italy. Two thousand and fourteen years after the battle of Trebia, a French artillery officer, by getting a single gun into a position that commanded the fortress of Mont Bard, unlocked the same mountain barrier, and commenced that career of conquest which scarcely paused till it encountered the terrors of a Russian winter, and was only finally checked on the plain of Waterloo. To the master manœuvre of the greatest general of all time, and to the opening enterprise of the greatest general but one of modern warfare, has now to be added the record of a third not dissimilar adventure—the march of Sir Robert Napier on Magdala.

Viewed in itself, it is the most perfectly conceived and achieved incident in the history of war. We do not say that its accomplishment ranks the successful engineer officer who planned and conducted it on the level of either Hannibal or Napoleon. Times and circumstances must be taken into account, as well as military facts. Neither the Carthaginian nor the French general could dispose at will of the unstinted resources of a mighty empire. The distance which Hannibal had to transport his troops was far less than in our case, but then he had not the aid of a bridge of steam. The troops of General Bonaparte had but to cross the frontiers of their own country, but they were for the most part a starved, ragged, shoeless mob. It was the genius and the glory of the two great invaders of the Valley of the Po to forge their own weapons—to form their own army. England and India have lent their treasure, their skill, and their blood to form the well-ordered and triumphant force commanded by Sir Robert Napier.

It is curious to mark the reappearance of one of the arms of the Punic war. When Captain Dugald Dalgetty was so overcome by the ridiculous ideas which he associated with the employment of bows and arrows as somewhat to endanger the cure of his wound, what would he have said if elephants had been proposed as beasts of military burden? Careful students, indeed, have been apt to remark that additions of great bulk and weight to the ordinary *impedimenta* of marching troops were involved by the use of elephants in the Punic and Pyrrhic wars, in the same way as by cannon in modern warfare. But the combination of the two, and that at the present time,—an Armstrong gun on the back of an elephant, marching over the mountains of Abyssinia in the year 1868,—could anything have seemed more wildly incongruous a few years since?

The passage of the natural barrier, however, was not a campaign, but the opening of a campaign. With Bonaparte there was no halt till Campo Formio. Rome was declared French at the Treaty of Tolentino. Rome was taken by the French in the following year. The victor of Thrasymene and of Cannæ stopped at Capua. The fatal luxury of Campania demoralised his army. It is always a question among military writers how far the pause of Hannibal was compulsory—a question not likely now to be solved, unless Pompeii yields us further literary treasures. As far as one can decide at such a distance of time and of scene, it seems all but certain that the rapid advance of Hannibal on Rome after the battle of Cannæ, that of Henry of Navarre on Paris after the battle of Ivry, or that of Charles Stuart on London after penetrating as far as Derby, would have changed the course of human history.

Then, again, we do not forget the illimitable resources at the command of the victor of Magdala. But resources, though much, are not all. The man who can rightly dispose of vast resources is apt to be a man of the same stamp as he who can create resources in case of need. And Sir Robert Napier found his main element of delay in the very wealth and abundance of his supplies. He had not the fertile valleys and plains of Lombardy, of Apulia, and of Campania, from which to draw the food of his troops. He even had to carry hay for his horses, for mules, and elephants. In the protection of his long line of communication, Sir Robert had a difficulty to contend with that was unknown to the great Italian conquerors to whom we have referred. Their advance, in point of fact, was that of a movable column, relying for its support on the contributions it could exact from the country. His was that of an army of invasion. It is true that he had not to fight for every step of his way: had such been the case, the capture of Magdala would have been impossible to ten times the number of troops; but he had to take military precaution against surprise. The *auri sacra fames*, the instinct of mankind to pilfer, is as strong among the Abyssinian Christians as it is in any civilised state. Our dusky neighbours would have felt no more "delicacy" than did an honourable Englishman lately referred to in our columns, in helping themselves to all and every article in our baggage-train, if we had only encouraged them by proceeding upon the principle advocated by some of our friends of the Peace Society. We were not fighting our way through an enemy's country, but we were making a military movement of extreme delicacy and magnitude, and one in which no military precaution could be safely—or was in fact—neglected.

This borne in mind, the gallantry, the rapidity, and the crushing success of the blow—a blow dealt with such a long arm—is without precedent in military history. The echo will ring through India and through Africa like that of the trump of doom itself. Not an Englishman is engaged out of England, in any of those occupations in which it is of importance to him to let his English citizenship be known and respected, who will not feel a couple of inches taller when he reads the tale of the storm of Magdala. Nor is the heroic element wanting on either side. Our men—we (one feels proud to use the pronoun)—fought chiefly against nature. The human foes were as nothing to the hostility of those pathless wilds and those lofty scarps. The fire of Theodore's troops did little more than serve the purpose of military music to raise the English mettle to that heat at which it is wont to go anywhere or to do anything. But it was different with the barbarian monarch, the descendant of Solomon and the Queen of Sheba. Savage as he was, he faced Death like a king of men. He turned not from those terrible and utterly astounding steel shells—a projectile that would have been apt to show a point in the character of Agamemnon or of Ulysses that was not suspected by Homer. The *feu d'enfer* opened upon him, but he faced the *feu d'enfer* with as unblenching resolution as if it had been a shower of *bon-bons*. He died a king, to his honour be it spoken—a king, though a savage; and he is entitled to a vote of thanks from the House of Commons for so doing, if it were of any service to him (it might have been more agreeable to certain members to vote it than it seems to have been to do so for our own officers and men); for by his heroic death he has added the only stamp and seal which could render our triumph unquestioned. His fall cannot now be *explained away*. Sir Robert Napier has carried off his *spolia opima*.

The point of view from which this brilliant and prudently ordered campaign is chiefly interesting to our readers is that from which we have had occasion to deal with all such subjects as those of artillery, fortification, military engineering, and military education. They are subjects germane to our pages. And the great lesson, to us, of the Abyssinian campaign is this: it enforces, not by the voice of calamity, but by the shout of triumph, the truth of that which we have long endeavoured, painfully and modestly, to insist on—the fact that war is changing, not in its nature, but in its method, and that the conduct of war is passing into the hands of the engineer. It is not the fearless and dashing cavalry officer—the *beau sabreur* like Murat,—it is not the unflinching head of squares and of columns, if he have all the courage of Ney,—it is the artillerist, like Napoleon, or the engineer, like Napier, who will be the general of the future.

For the first time in our history the independent command of a large force has been entrusted to an officer of Engineers. It will not be for the last.

Up to the time of the storm, and with the further exception of the military patrolling or guard of the stores and communications, the invasion of Abyssinia was an engineering task. The laying of the Bordeaux and Bayonne Railway across the desolate Landes bordering on the Bay of Biscay, by an English engineer and by English workmen, was, at a very modest distance, an operation of the same kind. Pioneers were not mere pickets of advance; the whole force had to work as pioneers; they had to make the road over which to go. The enormous military facilities of the railway system were not lost sight of. It seems to us that a little more civil practice and experience would have placed at the command of the general of the forces a longer and more serviceable railway. Considering what can now be done by properly constructed engines for surmounting inclines, considering how much less labour is requisite to excavate, to form, or to embank the narrow track which alone is absolutely necessary for a single line of rails, of perhaps 3 ft. 6 in. gauge, like some of our modern light railways, than to complete a good military road available for the transport of stores and of guns, as well as of cavalry, infantry, and elephants, we think the railway communication might have been more rapidly pushed ahead, to the immense reduction of all the contingent difficulties of the case. Barlow's rails, requiring no sleepers, and requiring, in the season we have just passed through, no ballast, would have been eminently suited for the service of a temporary military railway. Unless in face of very serious obstacles, experience teaches us that such a line might have been run ahead at the rate of more than a mile a day.

It may in this respect be said in reply that it is easy to be wise after the event, and that, in

presence of so brilliant a success, it is unbecoming to grumble. But there is one point on which we must express surprise—and we rejoice that we are able to do so in the tone of Fluellen rather than in that of Cassandra.

The intelligence of the fate of Theodore reached us in about a fortnight from the date of the event. The preceding intelligence, for some time, had occupied three weeks in transmission. The difference between the two periods may be accounted for partly by military reasons. It must have arisen in Abyssinia itself. But, making all allowances for the fact that it was probably the conviction on the part of the commander of the forces that no number of patrols at his disposal would enable him certainly to protect the wires of a field telegraph from the eager pilfering of the natives,—remembering how one of the inhabitants of this quarter of the world endeavoured to welcome Sir S. Baker by making off with his tent from over his head at a first interview,—we can conceive of no adequate reason for the absence of direct communication between the ministerial offices in London and the point of debarcation in the Red Sea. Why was not a special wire arranged for, and, when necessary, laid? What would have been the expense, as a mere matter of pounds, shillings, and pence, compared with the advantage to be secured? With an expenditure going on at the rate of 20,000*l.* per diem, what would have been the commercial value of a saving of some three weeks in every exchange of communication, backwards and forwards, between the general commanding the forces and the minister under whose orders he acted, on the one hand, and his subsidiary base of operations at Bombay on the other? Had the telegraph been abandoned when it had conveyed to Westminster the intelligence of the re-embarcation of the last English soldier on the Red Sea, the expense would have been a very wise economy.

But no such expense need have been actually incurred. It would have been only a first outlay, an outlay to be recouped in part, or almost wholly. The disgraceful state of our telegraphic communication with India is but too notorious. Independently of the solution of that great industrial question of the day, the centralisation of our telegraphic communications under the control of the authorities of the Post Office, it is clear that we must have more lines of cable to India.

The urgent need of instant communication with a half-way point was just one of those occasions of which a great minister would have been prompt to avail himself. We must provide, he would have said, a telegraphic communication, the best possible at short notice, by the time that our troops land. We can make use of the wires hereafter for expediting our despatches to India.

The overlooking a provision from the want of which, we may now safely and truthfully say, the whole cost of the expedition might have been doubled by the delay of its object for another year, is the more remarkable from the lesson on the subject which we received in 1866. The needle-gun was the arm which decided the battle of Sadowa. That was our declaration at the time. A little later it was rather thought to be an exaggeration. Subsequent research has confirmed the truth of the opinion, and all the military writers who have treated the subject now admit that it was the case. But while the needle-gun was the arm used in the actual crisis, the electric telegraph was the instrument which made that crisis possible. The double parallel march through the giant mountains, an extreme effort of military daring, was only rendered possible by the instant, uninterrupted communication of the commanders of the separated *corps d'armée* with the Minister of War at Berlin, and thus with one another. As it was, the success is inexplicable,—not the success in the field of the well-armed, well-shod, well-educated Prussian troops against the unprepared and ill-provided *personnelle* that crowded under the Eagle of the Kaiser, but inexplicable that any man with the least knowledge of the art of war, and with the merest handful of troops under his command, should not have endeavoured to strangle the heads of the long-drawn columns before they debouched from those difficult passes. Thus the service rendered to Prussia by the field telegraph is fully equal to that which she exacted from the needle-gun. The two are complements of one another. With increase of precision of range, and of repetition or rapidity of firing in the arm, increase of rapidity in the conveyance of intelligence is a consistent necessity.

If it should occur—which God avert—that we have to draw the sword in Europe, we cannot lay this great lesson too closely to heart. It is a double lesson. We see how the military nations of the Continent go to war; we see how we have done so ourselves: comparing our men, our artillery, our small arms with those of our neighbours, we have no reason for discontent. We are not resting on our oars; we are still making experiments and improvements at unstinting expense; but in our last great and noble essay we have neglected that powerful instrument by which the armies of the Continent are linked together as by the famous chain of the Saracenic guard, so long borne in the arms of Albret and of Navarre. It was all very well to deploy before the stronghold of Theodore unprovided with a telegraph, but what would have been the result if Magdala had contained a Von Roon?

Again, for our brilliant advance through Eastern Africa we chose our own time. We were absolute masters of the situation in this respect—to stay away or to go—to advance or to retreat. If we should have to fight, or even to stand in armed and grim neutrality, in Europe, this will not be the case. To those who are deaf to the warning sounds that issue from every camp and arsenal under the command of Marshall Niel, there will be very few hours of delay given to make preparations for a European war. Disarmament or war is becoming a positive alternative; and disarmament—if it takes the tone, "You put down that stick or I'll make you"—is a natural pretext for, and ingress into, war. Even in that case we may avoid the vortex. Truly so—and God grant that we may—but the impunity with which we can afford to look on will depend absolutely on the evident power which we possess to make our neutrality respected. And it is now the fact—and we shall do well to take heed of it—that our most brilliant success, a success which has attracted the admiration of our most habitual detractors, has not been unaccompanied by a signal neglect of one of the most valuable instrumentalities which the man of science has ever placed at the service of the statesman.

THE PUBLIC HEALTH GOOD.

THE Registrar-General's quarterly return for the three months ending the 31st of March last gives us the pleasing intelligence that on only two occasions since 1838, when a systematic registration of deaths first rendered statistics of mortality available, has England been so healthy during the first quarter of the year, as in that portion of the present year. The annual death-rate in those three months was 22·3 per 1,000 persons estimated to be living, while the average rate in the thirty years 1838-67 exceeded 25 per 1,000. In round numbers, the difference of the death-rate signifies that 15,000 fewer deaths occurred during the first quarter of this year than would have taken place if the average death-rate of the same period in the preceding thirty years had prevailed. The two exceptions above alluded to were the first quarters of 1846 and 1856, when the death-rates were so low as 21·6 and 21·8. In 1850 and 1857 the rate was respectively 22·6 and 23·0; and in the remaining twenty-six seasons of the period above alluded to the rate ranged between 23·5 and 29·1. The average rate of the last ten corresponding quarters, 1858-67, was 25·8.

The popular conviction of the influence of weather upon health has a larger proportion of truth for its basis than many other popular impressions. The thermometer during the winter season is almost as unerring an index of the rate of mortality, as of the temperature. The past winter has been almost unprecedentedly mild;—not that the mean temperature of the three months under notice, although in excess, was so far above the average, but there was an entire absence of continued frosts. Those who notice the weekly returns of deaths in London, for instance, may have remarked that whereas in open weather the numbers would range between 1,200 and 1,400, a week or two of hard frost generally sends them up to between 1,700 and 2,000. An improvement in the intelligence and material condition of the working classes, and a more general acquaintance with the best means of protection against severe cold adopted in those countries where low temperatures are regularly expected, may some day render us more independent of the influence of weather: till then it appears that continued frosts must produce high death-rates.

The mean temperature of last quarter, at the Royal Observatory, Greenwich, was 41·4° or nearly three degrees above the average of the same period in ninety-seven years. The rainfall was 6¼ in., and nearly 1¼ in. in excess of the average of fifty-three years, the whole of the excess occurring in January. The weather was somewhat cold during the first fortnight of the quarter, but during the remaining eleven weeks the excess of temperature was almost constant; it was greatest, however, in February. There was more than the average amount of movement in the air, but easterly winds were considerably less frequent during February and March than is usual in those months. These combined meteorological conditions doubtless exercised a very considerable influence upon the mortality.

The total number of deaths registered in England and Wales during the quarter was 120,095, showing a decrease of 14,000 upon the same period of 1867, and of 18,000 upon 1866. The decrease of deaths is apparent in nearly every part of England, the counties of Leicester and Westmoreland being almost the only exceptions. In rather more than half the whole population of the country living in large towns, the death-rate last quarter was 24·0 per 1,000, against 27·6, the average rate in the ten quarters 1858-67; while in the smaller half, inhabiting the rural districts and small towns and villages, the rate was 20·1, against 23·5 in the same period of 1858-67. It thus appears that the improvement in the health of the country was almost as great in the rural as in the urban districts.

In the eleven large towns of England furnishing weekly returns of mortality, comprising nearly all the largest, the death-rate last quarter averaged 24·9 per 1,000. Of these towns Bradford and Hull enjoyed the lowest rates, 22·0, and 22·1 per 1,000. London, with its more than three millions of inhabitants, stands next, with 23·3. The rates in the other towns, ranged in order from the lowest, were as follow:—Sheffield, 23·4; Leeds, 24·0; Birmingham, 24·2; Bristol, 25·6; Newcastle, 25·8; Salford, 28·2; Liverpool, 30·0; and the highest rate during the quarter, 31·3, in the city of Manchester. Perhaps the most important point connected with these rates is the remarkable improvement in the health of all the Yorkshire towns, but especially in Leeds and Sheffield. Newcastle has also been far healthier than in recent years. The rates in Birmingham, Bristol, and Liverpool do not exhibit the same extent of reduction upon recent corresponding quarters, owing to the prevalence, and more or less fatality, of the infantile zymotic diseases, measles, whooping cough, and scarlatina. Manchester is conspicuous for its high death-rate; in that city during the first three months of this year more than 800 deaths were recorded which would not have occurred had the death-rate not exceeded that in London. The excess of deaths was principally due to the fatality of measles, scarlatina, whooping-cough, and the different forms of fever within the city. Even the most strenuous opponents to the appointment of a medical officer of health for that city will scarcely refuse to acknowledge that this step has not been taken too soon.

The Registrar-General's return gives, for the first time, a table of the rates of mortality prevailing during last quarter in forty-six large towns, other than those for which weekly returns are published, and containing a population of about 50,000 persons and upwards. Leaving out a few exceptional cases (in which the estimate of population, based upon the rate of increase between the census of 1851 and that of 1861, appears to be unreliable), the rates of mortality in these forty-six towns have a very wide range, between 16 per 1,000 in Coventry, and 17 in Ipswich; and 32 in Bolton and Ashton-under-Lyne, and 34 in Stockport. In each of the two latter towns the deaths registered in the quarter exceeded the number of births. The publication of these statistics will doubtless excite a little more sanitary activity in many of those towns which have hitherto raised the average rate of mortality in our total urban population without the consequences of a systematic apathy in such matters being brought home to them. We have only to point to the steadily declining death-rates of Liverpool, Leeds, Hull, and other of our large towns, to show the effect of an awakened interest in their sanitary

condition which has been shown in those towns, in a great measure through the publicity which was given to the waste of life therein prevailing but a very few years ago.

It is beyond question that a more general appreciation of the influence of sanitary supervision upon public health is daily growing, not only in large towns, but in villages and in purely rural districts. It is impossible to estimate to what extent this has already influenced the rates of mortality; but evidence from all parts of the country testifies that in some measure the improved health of last quarter is due to a better outward sanitary condition of the people, as well as to the favourable temperature of last winter.

Infantile zymotics, however, were very fatal in many parts of England during last quarter; measles especially so in Leicester, Hinckley, Whitwick, Stockport, and Liverpool; scarlatina throughout the county of Durham, in Tynemouth, Manchester, and in many of the Lancashire towns. Measles caused 452 deaths in London, against 239 in the same quarter of 1867; and scarlatina, 368, against 339. The fatal cases of smallpox had, however, declined from 526 in 1867 to 280 in last quarter. It is naturally to diseases of the respiratory organs that we must look for the greatest reduction in the deaths last quarter; and of this class those from bronchitis had fallen most. The deaths from bronchitis in London, which had been 3,144 in the first three months of 1867, were only 2,282 in the same period of 1868.

On the whole, the present return must be considered most satisfactory; and, as the death-rate in the first quarter of the year usually furnishes a reliable index of the rate for the whole year, we may fairly hope that, with continued and increasing sanitary intelligence and activity, the year 1868 may prove one of the very healthiest on record.

ON THE UTILIZATION OF SEWAGE BY IRRIGATION.*

Drainage Basins and Conservancy Boards.

ONE of the most formidable of the obstacles which impede the sewage question is the complication arising from the fact that, while most of our principal streams receive in their course the drainage of many towns which have no other outlet, each of these towns has a separate and distinct system of sanitary administration, formed for the purpose of furthering its own peculiar interests, the whole having no more unity or cohesion than the particles forming a rope of sand. From this lamentable feature in the principles of our district government, endless evils originate; for without unity of purpose or will it too often happens that any step in the right direction made by one district is immediately neutralised by the inaction of its nearest neighbour, which, governed by the maxims of the old school, views every innovation as a direct attack upon its exchequer. Isolated and independent local government is doubtless an excellent thing, where such government has no bearing upon the interests of its neighbours, as, for instance, what can it matter to an adjacent community whether the bye-laws of a district insist on a twelve or a nine-inch partition-wall between contiguous buildings? But where broad questions arise, in which the common interests of a multitude of districts are directly concerned, such independent action on the part of each district becomes a curse, and instead of all policies for the common good being fused, they are forced into abeyance by the antagonism of Boards, whose powers for good are thus made impotent. To condemn the vices of independent and irresponsible local government in this respect is but to reiterate the fable of the quarrel between the various members of the human body; without the provident control of the head to keep watch over the combined necessities of the whole structure, it must speedily shrink into a dry and shrivelled anatomy.

The following extract from one of a series of valuable reports that are being issued by the Rivers Pollution Commissioners gives a faithful exemplification of the results of local government in a populous manufacturing district:—†

"The rivers Aire and Calder, throughout their whole course, are abused, obstructed, and polluted (to an extent scarcely conceivable by other than eye-witnesses) from Skipton, on the Aire, from Todmorden, on the Calder, down to Castleford. Our inspection was corroborated by incontested and overwhelming evidence; by the engineer to the Aire and Calder Navigation, as also by the men employed in dredging. Pollution by solids—ashes, mud, and other 'powse'—is increasing, and will yearly become worse and worse, unless some remedial measure be rigidly enforced.

It is impossible to treat quite separately the questions of obstruction and pollution. In many cases, where solids are carried into a stream, both injuries are of course inflicted upon it.

The rivers Aire and Calder, and their tributaries, are abused by passing into them hundreds of thousands of tons per annum of ashes, slag, and cinders from boiler furnaces, iron works, and domestic fires; by their being made the receptacles, to a vast extent, of broken pottery and worn-out utensils of metal, refuse brick from brick-yards and old buildings, earth, stone, and clay from quarries and excavations, road scrapings, street sweepings, &c. &c.; by spent dyewoods and other solids used in the treatment of worsted and woollens; by hundreds of carcases of animals, as dogs, cats, pigs, &c., which are allowed to float on the surface of the streams or putrefy on their banks; and by the flowing in, to the amount of very many millions of gallons per day, of water poisoned, corrupted, and clogged by refuse from mines, chemical works, dyeing, scouring, and fulling, worsted and woollen stuffs, skin-cleaning and tanning, slaughter-house garbage, and the sewage of towns and houses.

The practice of periodically flushing out into the streams the mud which must, under any circumstances, accumulate in goits, culverts, mill reservoirs, or 'lodges,' and canals, is also a palpable abuse."

The amount of annoyance, loss, and danger to public health occasioned by this complication of abuses is beyond calculation. High death-rates prevail; manufactures have been transferred to localities less abused; residential proprietors have been compelled to abandon and let their dwellings; and the beauties of river scenery have undergone a fatal transformation. Although the law professes to give distinct rights to the community in respect of the purity of streams, the vastness of the pollution takes away even the slightest hope of making them good. For an individual proprietor to attempt such legal rectification would be to ruin himself to no purpose, while for a community or a town to attempt it would only be less ruinous and absurd. The former has not only to encounter single-handed the doubtful process of common law, or the filing of a Bill in Chancery, but he must make up his mind to the creation of enemies on every hand, and to be viewed by all his neighbours as a public nuisance,—a consideration which generally imposes an effectual check upon all remedial proceedings on the part of the aggrieved. In the latter case, corporate bodies may indeed deal with their own nuisances as they think proper; but, as the river nuisances created within their own jurisdiction are usually insignificant, compared with those whose effects they suffer, and as the selfishness of mankind cannot ensure the following of such an example, much benefit cannot result; and, therefore, we find that in such cases nothing is done. At Wakefield, for instance, we have an example of river pollution. Before it reaches that town, the river Calder receives the sewage of an area containing 400,000 inhabitants, and the manifold impurities discharged from 1,200 manufactories. This water is drunk by the people of Wakefield after filtration, and so possessed are they of the impossibility of much further defilement that they do not scruple to add to it their own sewage and excrementitious matter before pumping it on to their filter beds.*

It is apparent, then, that a stringent law of prohibition is the only method of dealing with the pollution of rivers; and if the multitude of powerful communities whose health, pleasure, and means are daily assaulted by this evil, consider themselves mocked by the present statutes, it remains for them to have these swept away, and such a prohibitive measure introduced. It is a grave omission in legislation which places a safeguard over the interests of the proprietors of streams and waters in wild and thinly populated districts, and which yet leaves the rivers of districts abounding with vast and busy populations, entirely at the mercy of those who in every conceivable form combine to render them odious to the sight and dangerous to the health of the community at large.

Some portion of this neglect may doubtless be attributed to a dread—instinctive in a manufacturing population—of interfering in any degree with the supposed interests of its various industries. Thus, in the northern coal-fields of England, a prejudice has long existed in favour of smoke. "Where there's reek there's brass" is a proverb in these districts, and much disfavour has been shown towards the Smoke Act. The presence of dense black volumes of smoke, issuing from tall chimneys, has become identified with the creation of wealth. But it has been proved, and the proof is now spreading, that "reek" is really an item of waste; and as this idea gains ground the consumption of smoke becomes general.

So in respect of the pollution of rivers, there is still a feeling amongst manufacturers that they should be left undisturbed by legislative prohibitions. But much of this feeling has subsided since the visit of the Rivers Commission to the Yorkshire and Lancashire coal districts. It was clearly proved during the sittings of that Commission that the most noxious portion of manufacturing refuse might be kept out of the rivers by the exercise of care, at a very slight cost, and that in some cases the value of the ingredients regained would leave a profit upon the process of clarification. It was also proved that some branches of the fine woollen and calico trade were migrating from the West Riding of Yorkshire, from no other cause than the scarcity of pure or clear water. The Commissioners pointedly state that in the Aire and Calder districts "the abuses and pollutions of running waters have become almost intolerable, and even trade is seriously injured in consequence."*

The forcible interference of legislation is accordingly no longer viewed with such extreme jealousy, and amongst the more scientific and enlightened of the manufacturers such a course is considered absolutely imperative.

It is with a view to the amendment of this disorganised state of affairs that certain Catchment and Watershed Areas of Conservancy have been proposed, whereby the basin of every important stream shall be divided into convenient districts, generally separated by lines of watershed. Over these districts it is proposed that certain Boards of Control, exercising comprehensive powers, shall preside. The duty of such Boards will be to prevent the pollution of running waters by any matter whatsoever interdicted by statute, full powers being given them to pursue the offending party at law, to act in concert with each other, and to act in perfect independence of local interest and prejudice. It is justly argued that until an Act providing for the construction of such Boards be passed no progress in the utilisation of sewage, or the purification of river waters, can be made in the manufacturing parts of Great Britain. It is because this policy was neglected in the interminable discussions on the metropolitan drainage question that the vast and magnificent labours of the Board of Works have not been attended by such perfect results as were anticipated, a neglect which has been tardily amended by the Act relating to the Valley of the Thames.

Mr. W. J. Ffennel, late inspector of the fisheries of England, has recorded his opinion, that there should be a central authority in London, with deputies in the districts, having separate control over separate basins, but with unity of action, and all subject to supreme authority; and also that there should be definite power given to this authority to prevent the pollution of rivers.† It was asked during the sitting of the Committee upon Metropolitan Sewage that if local Boards were put under the jurisdiction of the Home Office, or the General Board of Health, which should in either case have the power to issue a *mandamus* to compel the enforcement of the law, such a course would not be better than to have a central Board in London. But Mr. S. H. Gael, a gentleman profoundly experienced in the preparing of bills relating to the public health, did not approve of the plan suggested, and said it would involve nearly the whole machinery of a central authority, as well as that of a district authority. He also cited the analogous nature of the salmon fisheries legislation, and counselled a similar mode of treatment in respect of

* See pp. 146, 168, 203, 222, 239, 290, and 313, *ante*.
† Third report, vol. i. p. 2.

* Rivers Pollution Commission. Third Rep., vol. i. p. 46.

* Third Rep. p. 54.
† Rep. Met. Sewage, 1864: 2,994-6.

sewage. Under the Salmon Fisheries Act, the Commissioners assign districts to the Boards, who are to carry out the law locally on the salmon rivers and their tributaries, and who have power to prosecute traders and manufacturers whose works pollute the streams.*

Touching the inconvenience which such prohibitory powers over water-courses would effect towards manufacturers, sufficient has been learnt on this subject of late years to show that in most cases it would be merely temporarily. A letter addressed to Mr. Ferrand, M.P., by Mr. Edward Townend, of Cullingworth Mills, near Bingley, shows what has been done in this regard. The writer says,† "The main feature of the principle we have adopted for the filtration of the dye and soapy waters from our works is, the passing those waters through a bed, 15 ft. to 20 ft. thick, of engine ashes, leaving the solid matters as a crust at the bottom of the tanks, formed of engine ashes; the crust, of course, having to be taken from inside the tanks regularly at stated periods,—say twice or three times per month. This crust makes excellent manure, and we spread it at once on grass and arable land. With especial reference to the soapsuds, they go from our wool-warehouses into tanks, very strongly made, and lined with double bricks walled in cement. The suds are then boiled in these tanks and broken with acid. The *magma*, or thick creamy part, rises to the top. The thin watery part below is run off into the engine-ash filters, percolating through them into the bed, and thus escapes in quite a clear state. The thick part left in the brick tanks is then run into filters made of cocoa-nut matting lined with canvas, and when of the consistency of, say, cream cheese, is wrapped in canvas bags, to be pressed in a steam press, whereby the grease is pressed out, of which we make about 30 cwt. per week, besides a large quantity of solid manure, in the form of oil-cake, which is periodically taken on to the land, and makes very excellent manure. This system of purification is readily done in moderate-sized works. The grease we extract from the soap is now worth 17*l.* per ton, and is sold to candle and soap manufacturers."

Mr. Rawlinson, late chairman of the Rivers Pollution Commission, has thus expressed his views in a letter to Lord Robert Montague:—‡

"With respect to Boards to manage drainage areas, I fear any plan of representation embracing even one member from each separate local Board will not prove to be practicable, on account of numbers. Take, for instance, the Aire and Calder drainage area, which is about 800 square miles. There are at present seventy-one local Boards, and will be more. Each such local Board may require to be rated for river improvements, and controlled with respect to outfall sewage; but a Drainage Area Board with only seventy-one members — one from each Board—would be cumbersome for work. There must, however (if representation is to rule the formation of such Boards), be canal, river, land, and mill representatives. I must confess that I do not see the way to purely local Boards for drainage or river areas. The machinery must be in some other form. Rivers require to be improved and preserved from injury, irrespective of county, parish, township, or private boundaries. Permissive power will only mean power to do nothing, as at present. Those who abuse will, for the most part, govern; and, as in the case of the Smoke Act, any Act of a similar kind will, like this, be a dead letter. Of what use is a Smoke Act in Manchester, Salford, Wigan, and other manufacturing towns, where the members of the several corporations are smoke makers? Suppose the factory owners had been required to appoint and pay factory inspectors, how much useful inspection would have been done?

"I do not like advocating Government interference in river preservation, but I do not see my way without it. Any Board, to be useful, must consist of working members, with ample powers to devise and execute works, to purchase and remove mill-dams, to embank, to drain, and to prevent all forms of abuse on rivers. A drainage-area rate would have to be laid and collected, superintendence should be regular, and an annual report ought to be published. Machinery such as is sketched out will be difficult to establish."

Mr. Rawlinson speaks here with admirable force and justness, which are perhaps somewhat qualified by the terms of the concluding sentence. With equal force, and divested of all doubt as to the practicability of their suggestions, the Rivers Commission, in their Third Report, reiterate these arguments, the interval of three years' close and exhaustive investigation having but served to strengthen their opinions into immovable conviction. After making a comprehensive sketch of the progress of the woollen and worsted manufactures in the West Riding of Yorkshire, so far as regards the basins of the Aire and Calder, and reporting the evidence taken during the sitting of the Commission, the Report proceeds to state that, "in order to prevent the pollution, and legally control the management of rivers, their basins or watersheds must be placed under supervision, irrespective of any arbitrary division of county, parish, township, parliamentary, municipal, or local Government Act boundaries, or, indeed, of any artificially-established division. Running waters flow on from their source to the sea, and, if the upland waters are polluted by town sewage and by refuse discharged from manufactories, as in the West Riding of Yorkshire, the entire length of a river is necessarily polluted. Towns situated midway, as Leeds, Manchester, Salford, and many other places, will establish and carry out local improvements, and would clarify their sewage and other refuse fluid to little practical purpose, if the towns, villages, and manufactories on the same river with themselves and its tributaries, are not placed under restriction against sending down pollution. Thus, for instance, the corporation of Salford, which occupies one side of the river Irwell, opposite Manchester, entertained the idea of intercepting sewers. Plans were prepared and estimates made, and the project was discussed, but was abandoned on the plea that money expended in Salford alone on such works would not accomplish the purification of the River Irwell, so long as Manchester, and all the great manufacturing towns and mills of Lancashire situated on the river and its tributaries, continued to pollute the running waters of their respective districts. Pollutions caused by sewage, and by trades and manufactures, ought, in our opinion, to be prevented at the cost of the communities and persons causing such pollutions. At Croydon, at South Norwood, and at some other towns it has been forbidden by injunction for the local authorities to pass town sewage into running waters below a defined standard of purity, and the result has been, after the failure of all other systems, a clarification of such sewage by irrigation, which not only proves successful for the purpose desired,—namely, to prevent river pollution,—but in its operation is a source of profit to the ratepayers. However that may be, the question of profit or loss in abating nuisances . . . ought not too closely to be taken into account. . . . Towns can as well afford to pay for the means and appliances necessary to render sewage innocuous to running water as they can to pay for the sewers and drains which are necessary to their sanitary well-doing. . . . Every witness we examined admitted the existence of many great evils, and remedial measures are in the evidence over and over again suggested, the reiterated stipulations being that such measures shall be as general as the trades to be affected by them, and that their enforcement shall be by Government authority.

"One conclusion, therefore, forces itself upon any one who honestly deliberates upon the existing state of things in regard to the rivers we have visited, with a view to its permanent improvement. A stronger power than has hitherto been available must be brought to bear, if the present abuse and pollution of streams is to be arrested, and Government supervision and inspection must enforce and strengthen the action of local authorities.

"As previously mentioned, there is plenty of land in the Aire and Calder district suitable for sewage irrigation, and we have no experience of any town or locality where the application of that system would be impracticable. . . . . All refuse from dyeworks, mills, factories, tanneries, breweries, malt-houses, slaughter-houses, and the like, should be prevented from being cast into and polluting running waters. No ashes, cinders, slag, waste earth, mud from canals, goits, and reservoirs, road-scrapings, broken pottery and utensils, bricks and building rubbish, or any other solid calculated to impede the flow of water, raise the bed of the stream, and cause impurity, should be permitted to be cast in, or so to be disposed on the banks of a river as to be carried in by its water. Sewage interception is always practicable. Where it can be applied fresh to the land there is least nuisance and least cost to the ratepayers. Where the solids are extracted by mechanical deposition there is pecuniary loss on the operation, and running streams receiving the effluent water are still polluted, the pollution being greater as the volume in the stream is relatively small. No arrangements for treating sewage are satisfactory except its direct application to land for agricultural purposes.

"It is for the interest of manufacturers, as well as of riparian owners, and the community at large, that a preventive law should be equitably but rigidly applied. For such legislation, the successful operation of Lord Derby's Act, which has abolished the nuisance from alkali works, affords a fitting and encouraging precedent.

"Our experience of the weakness inherent in unaided and uncontrolled local authorities, as at present constituted, convinces us that a central Board, appointed by a State department, is necessary to the efficient protection of running waters. For instance, under the Local Government Act, 1858, a local Board may be established, and, after having executed works on borrowed money, the ratepayers may decline to elect a Board; or the members of such local Board, after election, may decline to act, there being no power at the Home Office to compel them to do so. Such power, however, will be absolutely necessary in any conservancy Act to enforce the prevention of river pollution.

"Economy in the work of a central Board for the conservancy of rivers might be probably obtained by enabling it to avail itself of such parts as may be applicable of the existing system of Government inspection, as of factories, mines, alkali works, fisheries, land drainage, &c."

The Commissioners then go on to observe:—"The duties of such central and district conservancy Boards might be—

1. To aid the Salmon Fisheries Commissioners.
2. To prevent the obstruction of rivers and running waters by casting in of solids or flushing in of mud, as also all forms of river pollution.
3. To take cognizance of all existing weirs, mills, dams, river-walls, embankments, reservoirs, goits, culverts, drains, &c., and of any new works proposed which may affect streams.
4. To hear appeals in cases of local disputes as to works of any character affecting the condition and free flow of rivers."*

Sundry geological and other plans accompanying the Report, showing the different basins of the West Riding—those of the Aire and Calder as apportioned into sub-conservancy districts.

M. P.

* Rep. Met. Sewage, 1864: 3,197—3,207.
† Rep. Met. Sewage, 1864: p. 277, App.
‡ Rep. Met. Sewage, 1864: p. 273, App.

ON BUILDINGS FOR EUROPEAN OCCUPATION IN TROPICAL CLIMATES, ESPECIALLY INDIA.†

The structural difficulties mainly to be anticipated can be, I think, summed up in one word,—*want of appliances*. There is in India, at least, no want of hands. Labour is plentiful and cheap there, and a surprising degree of some sorts of skill still exists in plenty also, and this is probably more or less true of every place within the tropics where buildings of importance are likely to be needed by Europeans; but any appliances beyond the rudest for raising weights, putting materials in their place, fitting together unwieldy portions of a structure, or even building a scaffold or hoisting a block of stone, may be expected to be scarce. In a peculiarly un-English method many sorts of works are well carried on by the natives, who seem to retain, along with the ruder ways of common building, some lingering traditions of arts long almost disused in the cities chiefly occupied by Europeans. A building in progress is, however, a curiously uncouth sight to unaccustomed European eyes. The scaffolding, so irregular and insecure in its appearance, seems only fitted to fall, yet it does its work; vast crowds of half-naked workpeople, those carrying burdens being mostly women, each bearing on her head a light load of what has to be transported; the mason squatting on the stone he has to dress, holding his chisel in the tips of his fingers, and dealing dainty taps with a small hammer, as though he were a sculptor finishing off a marble statue; the smith squatting over his fire, as though his feet must be among the sparks and cinders, as well as his iron; and among them all the dusky overseer with long white robes, and perhaps an

* Third Rep. vol. i. pp. 53-56.
† By Mr. T. Roger Smith. See p. 311, *ante*.

enormous red turban, perhaps a tall glazed cap, and on his brow bearing the distinctive mark of his favourite idol, advances with the most obsequious of bows, his posture intended to convey the idea of an entire devotion to your service—not always carried out by his conduct. On such a work as this, busy and active though it be, an iron bolt or a cramp or a joggle, not to mention a powerful crane or a crab, which here it would be the simplest possible thing to have, would be something of a difficulty even in such a city as Bombay; elsewhere it might prove a formidable undertaking, perhaps even an impossibility. Nor is sending things over from this country always a safe and complete resource, although it has to be largely practised. Every one knows how often when such things as ironwork, metal-fittings, &c., are sent on to a building at home, there is something wrong. Bolts going somewhere where a spanner cannot be got on to turn the nuts; things that refuse to match or to fit their place, are serious hindrances even here; but when the original foundry is four thousand miles off, so that either a clumsy makeshift made on the spot has to be adopted, or a delay of six months has to be endured, before a casting sent in error or broken in transit can be replaced, it is obvious that every complicated appliance ought to be avoided where possible; and where not, that everything of the sort should be put together in this country *completely* before shipping, and that duplicates of everything liable to damage or loss ought to be provided in abundance. In reference to breakage I may, by the bye, remark that more of it occurs in landing than on the voyage. Castings will travel excellently well if stowed along with plenty of small coal, but their disembarkation should be specially superintended. The necessity of hoisting a large weight or fixing a difficult piece of masonry may prove an insurmountable obstacle; and the employment of anything that would be considered even moderately difficult in this country ought to be avoided, unless the architect have previously ascertained that the means of carrying out his intentions exist at the locality where his building is to stand, as in part they do in the larger cities and most active colonies. In short, in designing for the tropics the architect should suppose that his work is going to be carried out much as Mediæval work was done, and without any modern appliances whatever: and how lightly such a limitation need sit on a true artist may be easily understood by recollecting how grand and how perfect were the buildings which our predecessors erected in an age when steam-cranes, travellers, and railways were unknown, before iron had been introduced into buildings, and when roads were bad and hoisting little understood.

The materials obtainable in any tropical locality will be sure to differ somewhat from those at home. As a specimen, I will give an account of what is obtainable in Bombay; and here let me say that Bombay must be taken as on the whole a very favourable specimen of an Indian city. It is the capital of Western India, fast becoming the greatest commercial emporium of India; is a city of great wealth, and has a population of about a million, rapidly increasing; and has one of the finest harbours in the world. Whatever, therefore, is wanting in Bombay will not be likely to be better supplied elsewhere.

This island is volcanic, and no stratified stone seems procurable there or for many miles round. The ordinary building stone is a very hard, rough, slate-coloured basaltic trap, quarried with difficulty, all having to be blasted, chiefly used in stones of small size, as rubble, laid with plenty of mortar, and plastered externally. It will make good but rough rubble work if squared up, but much of it proves to be perishable when placed in a building. For dressings and ashlar there is a scanty supply of one or two varieties of yellowish trap stone, called Coorla stone, of a hard, unyielding nature, very difficult to procure in large blocks. A brownish granular limestone, closely resembling the worst qualities of Bath stone, and known as Porebunder stone, is imported by sea from the coasts of Kattiwar, a distance of some 300 miles. This is the best available material for masons' work in dressings or architectural features, but it is liable to discolour after being some years in a building. It is often defective, and it is so costly that, on any large work, it would probably be a saving to import Bath or Caen stone from Europe. Native bricks are very dear and small, being thin, like Roman bricks. They are mostly defective, but are available for internal use. Bricks of English pattern are brought to Bombay some thirty miles, from Callian, but are even dearer than native bricks, and not very satisfactory; and I know of one instance, at least, where the facing bricks of a large proposed building have gone from England to Bombay. The fact is that good material and fuel for brickmaking are both equally scarce. A coarse, spongy conglomerate, known as kurial, is occasionally used for filling-in and internal walling. I believe it to be a species of coral, and it is probable that some coralline material may in many tropical localities be obtained of a serviceable quality. Gravel there is none: for sand there is only sea sand, which at Bombay is not silicious, but ground-up basalt, rounded by action of water. Of course this would be different in many localities. Laminated stone there is none, so that any thin paving stones have to be imported from Europe. A rough paving of the local trap is in use, but is very expensive. Lime and timber are the two materials which alone can be described as really excellent of their kinds. The lime is known as chunam, and is obtained mostly from Kunker, a nodulous limestone found in the neighbourhood of Bombay, a small supply of the best quality coming from shells. Where cement is required it has to be imported from England. For some purposes which are served by cement with us,—such as fillets and hips,—a kind of temporary expedient called dammer is made use of. This is a sort of coarse resin mixed with oil, melted, and paid on hot, like pitch, with or without the addition of strips of canvas among it to make it hold better.

Flat terraced roofs are not so common in Bombay, for the buildings either of Europeans or of natives, as they are elsewhere in the tropics. Where they are used they are ordinarily of chunam, and very thick.

For all carpentry and joinery, Bombay, like other parts of India, has recourse all but exclusively to one material—teak timber. This wood is extremely tough and strong, and can be got in great scantlings. It is hard to work, but has the three cardinal virtues, that the ants do not eat it, the rainy season does not rot it, and, when seasoned in India, the Indian sun does not warp it. Wherever teak is procurable the designer of buildings for the East will do well to employ it alone, unless he is sure that any substitute he proposes will fulfil all three of the above conditions. Timber is often used by the native builders, for such purposes as joists and rafters, in the form of unsquared round poles, or some other rough shape. The best teak is from Calicut, the next quality from Moulmein. Black wood, which rivals teak in its indestructibility, is only used for furniture. There is plenty of rough timber to be procured for ordinary and temporary purposes, but not proof against the white ant.

The native tiles are an exceedingly bad roof covering; and nothing but the extreme difficulty of obtaining those substitutes which would be an improvement has caused them to be retained in European use. They are of very thin red porous tile, almost semi-cylindrical in section, and about 9 in. or 10 in. long. They are laid course, are laid quite loose on the roofs, and are consequently so easily decayed and damaged that a relaying of them, called tile-turning, is an annual part of the preparation for the wet season. Galvanised corrugated iron has been imported to some extent from England, and is sometimes used as a roof covering; it is not altogether well suited to the climate, but is an improvement on the tiles. Where used for roofing, it ought to be employed double, with an air space of 10 in. or 12 in., with free access for ingress and egress of air between the two skins, and then it is found to form a tolerably cool roof.

All ironmongery has to be of *brass* to withstand the damp of the monsoon time, and if it is to act at all as Europeans like hinges and latches to act it must come from Europe; so must window glass, and marble or tile pavements. The ordinary material available for floors is a filthy pulp of cow dung, laid by native women, who spread it about with their hands, often jewelled, with great unconcern. I must admit that this unsavoury mess quickly hardens into a good and inoffensive floor; but it requires renewing with fresh applications of the material almost fortnightly. Tile floors, or chunam floors, are of course preferred by Europeans, but they are disliked by the native servants, all of whom go barefoot, as cold to the feet.

Window glass is, I believe, obtained solely from Europe, and till lately came only in small panes. Rolled iron joists, to be used in a flooring similar to that of Fox and Barrett's patent, are to some extent imported; but the excellence of teak as a material for joists leaves room to doubt whether the ordinary floor, which is constructed with a sort of concrete filling-in between teak joists, is not quite as good. Dennett's arch, perhaps used in connexion with Phillip's girder, and Ransome's artificial stone seem both of them appropriate inventions for use in cities within the tropics, but less available in Bombay than elsewhere, owing to the absence of good sand or gravel, or of any fair substitute. Terra-cotta as a substitute for stone dressings has been to some little extent introduced, and promises to be very serviceable. Laths are not forthcoming; the split bamboo, which is the best substitute, is liable to be eaten by the white ant, and this is, I presume, the chief reason why plastered ceilings are very unusual. Their place is usually filled by boarded, and often by canvas ceilings. Plastering in chunam on walls is coarse and soft. As papering is unsuitable (it would harbour insects), the ordinary finish is an inferior kind of distemper. The saltness of the sand renders the walls hygrometric, but if damage from damp could be guarded against, a treatment like the interiors of Pompeii would be the proper internal finish. There is a very superior sort of chunam plastering known as Madras chunam. It very closely resembles fine Parian cement, but is so expensive as not to be often employed.

Plumbers' work is all but unknown in Bombay, except occasionally for water-pipes. Gas-fitting is, however, now in use there, as gas has been lately introduced, and would have now to be provided for in arranging buildings for that city.

I have, I think, in this list, said enough to show that a building intended for Bombay, even if designed in accordance with the climate, but requiring for its erection large blocks of stone, landings, or even much ironwork, or such things as slate slabs, panes of plate glass, or flat tiles for floors or roofs, would have to be modified on the spot, in respect at least of those parts—unless all required was sent out from England; and though, perhaps, some of the localities for which the services of an English designer may be required will be better off than Bombay in some one or two particulars, it is more than likely that they will be worse off in others, so that an acquaintance with the material resources of the place, and the utmost anxiety not to overtax them, is required of every architect of a building for tropical climates.

The administrative difficulty is, however, likely to be greater than the constructive in any case that may probably have to be encountered by any of us, and is much more likely to be overlooked or misunderstood by an architect who has never travelled beyond the limits of Europe.

The available modes of carrying out a building abroad, as at home, are of course either through contractors, or by engaging labour and buying materials. Native contractors of some sort will be found in most large Asiatic towns; and in many places, where there is an extensive European settlement, English or American contractors are to be met with. Where it is probable that the works will be carried on by them, it is important that the documents sent out to explain the architect's intentions should be in such a form as they will understand. Here it may be worth while to add that, at least in India, the documents need not be translated into any foreign language; simple good English will be thoroughly well understood by those natives engaged. Specifications should be clear, distinct, and full, and, above all things, free from such technical words as are not known to be in use in the place where the work is to be done. Drawings should be very full and clear, and should bear on their face written directions as to what is intended by any difficult, or unusual, or intricate arrangement or construction. Simple bills of quantities will ordinarily be valuable, but they should not be taken in much detail. They should also afford more means of tracing on the plans the work which they describe than is usual in England; and where much work has been done under the Royal Engineers, so that the contractors are accustomed to their routine, it may be advisable to throw the bills into the shape ordinarily employed by them, and which are taken very much in the gross, and are arranged to exhibit on the same page the dimensions as well as the result of each of the few measure-

ments made use of. This will be not only advisable, but probably necessary, if the work is under any colonial Government.

In many instances it will not be possible for work in the tropics to be contracted for, and it will be done by day labour. If the English architect has to find some one to take charge of such an undertaking, it will be most desirable to get a superintendent, not only familiar with the work, but also acclimatised to the country, and used to dealing with natives. If these points are neglected, or any one of them, the work will run a great risk of being entirely stopped. Upon the risks due to ignorance of the work I need not enlarge, but it is as well to note that if the superintendent be unfamiliar with the climate and imprudent there is every risk of his being seized with fever, or sunstroke, or some other violent ailment, such as besets a hot climate, especially where there is exposure, and so laid aside; or, if this be escaped, the work may be equally hindered by the superintendent being imposed upon by the craftiness of the natives, or by his blundering through ignorance upon something distasteful to the natives engaged; as, for instance, I have heard of a very extreme case of an entire work being deserted by all the men engaged upon it, owing to the European superintendent having laid his hands on one of the workmen, whose notions of caste were thereby outraged. Such a thing as this may seldom occur, and the narrative may have been exaggerated, but the unwary agent will be extremely likely to be overreached by the craft or overpowered by the caste combinations of natives, which last are quite as formidable as our own trades unions, and even more unanimous in action.

If the work be for any colonial Government, the probability is very great that it will be handed over to an officer of Royal Engineers to carry out by day labour; or, as it is officially termed in India, departmentally. Large numbers of plain buildings, such as barracks, are executed by the officers of this body from their own designs, according to plans and estimates prepared by themselves, they purchasing the materials and employing labour; and their system for doing this work appears to me admirably well organised for this purpose; but any one who has had experience of it will fully understand that neither architecture nor building is the proper function of military engineers, and that as an executive this corps is not suited to the requirements of work of high architectural pretentions, and that it hardly seems giving military officers their proper position to employ them upon the carrying out of any work except from designs prepared by the officer engaged. At the same time that I make these remarks, I must add that this corps contains individual officers who have distinguished themselves in India as architects by their designs and executed works; and that they have been pioneers in the work of constructing in that country buildings for European use. They have excellent facilities for procuring from England such articles of European manufacture as they want, but perhaps have been themselves led by this very facility, and by their example have led others, to neglect the cultivation of the resources of the country. If the proposed work be Government work, it will in some way, probably in every way, be under the Public Works Department, wherever, as in India, such a department exists, and taken in hand by the military engineers of that department; and the great evil which, in that case, the architect has to fear, and if possible to guard against, is his work being wholly or in part modified, set aside, or superseded. To prevent this, the precaution should first of all be taken of being quite sure: that there is nothing which will *require necessarily* to be set aside,—nothing manifestly unsuited to the climate, to the materials of the locality, or to rude and imperfect workmanship and means of execution. The architect should, secondly, be quite sure that there is nothing which will require necessarily to be added; his drawings, while as little voluminous as he can make them, should be so comprehensive and complete as to furnish every detail, anticipate every question, and supply all needed information. Thirdly, he should be quite sure, that all his documents are regularly in the form customarily used and understood by the engineers, especially his detailed estimate; to use a homely phrase, he should send out the whole thing cut and dried. Lastly, he should omit no opportunity of getting any official sanction and mark in the shape of seals or signatures on the drawings, or official and thoroughly formal minutes and memoranda in their favour, as he can by hook or by crook obtain from any one in authority. The reason of this last suggestion is, that in India, and more or less in all colonies, very frequent changes in administration occur; so that if the official sanction of an officer be not obtained early to anything which he has agreed to and ought to sanction, there is a great risk that he may be suddenly promoted or transferred, and the matter fall into the hands of a successor, who, if not bound by the official action of his predecessor, may take some totally different view, and upset all that has been done. This labour, you will perceive, is greatly in excess of what is required upon an English building up to the time of sending away plans, and it requires to be well remunerated. It is considered, by those best qualified to judge, that if thoroughly well done, the work on a proper set of plans, &c., of this sort, equals all that is wanted here up to the time of making contract, with the addition of about half that which is subsequently done by the architect here during the time of his superintendence of the building.

I may add that the Government of Bombay has officially recognised the scale of professional charges issued by this Institute. It is, however, quite possible that, at least in the case of architects residing and practising in India, these rates ought in fairness to be increased, for it is, I believe, customary for the members of other professions to charge double the English fee for their services. At least, this is understood to be the practice of physicians, solicitors, engineers, &c., at Bombay, and probably therefore will be the rule in other parts of India.

But to return to the agency for executing works. There can be little doubt that in the case of any very large work, the employment of an European contractor of energy and skill furnishes the best guarantee for the good and rapid execution of the work; and any members of this Institute who have heavy works in tropical climates will do well to urge on their clients the great advantage, almost the necessity, for employing the best English contractor who can be found, making liberal terms with him, and stipulating for his sending a representative to be on the spot, experienced in work, used to deal with natives, and already accustomed to a tropical climate. It will, however, only seldom happen that a work is important enough to tempt a good contractor from England, and European contractors settled abroad, or the native contractors, will usually be the agency best to employ; and of these probably native contractors will as often as not be found the most useful; but in either case it cannot be too much impressed on the architect whose designs are to be carried out by hands used mainly to different work, and certainly unused to him, that the instructions conveyed by his plans and documents should be very full, very lucid, and very unmistakable, and that simplicity should regulate and pervade all his contrivances and arrangements.

There still remains the ultimate question, and the most purely architectural question of all. What aspect, as works of art, shall we, as artists, strive to impress upon the buildings whose arrangement and construction we have been considering? I shall not attempt to examine this question at all in detail, but cannot forbear raising it; for the art of any building is undoubtedly the one element, whatever value we may put upon it, which concerns us architects peculiarly and almost exclusively. All classes of builders require to understand materials and construction. Many unprofessional men require to comprehend the arrangement of buildings and organisation of works. Professional men in other branches of the great building art are called on both to comprehend and carry out all these; but it is our special honour that to us is committed the charge of those works which it is desirable to render, not merely serviceable as structures, but impressive as monuments; that of us is expected, indeed, not merely a work of skill, but also a work of art. I hold that the solution of the question lies first in the adoption of a type essentially European; and secondly, in the retention and blending with it of such admissible features as are to be found in the best styles of architecture that have been elaborated already in tropical climates.

Had we a distinctive modern English style, we ought, unquestionably, to use it in our colonies as the Roman did in his colonies, with such changes as local circumstances made necessary. But though this is unhappily denied us, there are in existence distinctive European styles; and I hold very strongly that as our administration exhibits European justice, order, love of law, energy, and honour, so our buildings ought to hold up a high standard of European art. They ought to be European, both as a rallying-point for ourselves, and as raising a distinctive mark of our presence, always to be beheld by the natives of the country.

As far as I have seen it, most of our building work in the East is not creditable to our taste, though it bears witness to our energy and vigour. It is unmistakably European, but of a very bad type. Now, the proper corrective is not, I hold, the direct imitation of Asiatic types, but the adoption of those European styles which have grown up in sunshiny regions. Such styles are ancient Roman, or even Greek (when good enough materials and workmanship are procurable), or the Renaissance and Gothic of Southern Italy or Spain, or the Early Gothic of Southern France. In treating any of these styles, and still more in treating any more northerly modifications, a leaning towards the peculiarities of the best Oriental styles is desirable. Among these peculiarities, the following may be enumerated as frequently found:—Walls of ample thickness, often covered with a profusion of delicate surface-ornament, frequently beautifully coloured; an absence of such vertical breaks as buttresses, and a prevalence of horizontal cornices and level projections; openings, usually wide and frequent, artistically grouped, often filled in with exquisite pierced patterns; mouldings infrequent; balconies and various sorts of corbellings, covered usually with carving; roofs of low pitch, flat, or domical; walls, often replaced entirely by lines of piers or columns; for the most part, and with some notable exceptions, moderate height, but usually great extent and elaborate surroundings. The whole have an aspect of breadth, richness, shade.

In concluding, I should like to throw out the hint that these peculiarities may be found worked out in the most perfect manner, and with complete adaptation to the exigences of a fiery climate, in the best of the Mahometan buildings, which mark, as I should like ours to do, the residence in India of a conquering race,—a race, alas! far more artistic than we, and whose works are nobler monuments of art than it can be hoped ours may be. Many of the finest of those fast-decaying and ill-protected works—those at Ahmedabad—are partly represented by means of photography, and so available for study; and if, in addition to affording such information as at least a few of our members may find useful and interesting, I shall have succeeded, by again pointing out these works, which have been already described here, in inducing architectural students to dig in this hitherto all but unexplored mine, I shall have the gratification of knowing that this paper has not been quite barren of results.

COMPETITIONS.

New "Yorkshire Club," York.—The members of the Yorkshire Club, that has been established since 1839, having found that the increase in their numbers necessitated better accommodation than could be obtained in their present home in St. Leonard's-place, and having procured the freehold site now occupied by the house and garden of the Rev. Thos. Richardson (of which the north front faces the Lendal, the west Museum-street leading direct to the Minster, and the south the River Ouse at the point where it is crossed by the Lendal bridge), invited designs in competition from several architects, from which they selected three, and requested their authors to re-compete, as they had somewhat altered the position the erection should occupy on the ground. Of the three second sets of designs the choice fell on that submitted by Mr. C. J. Parnell, of London, who is entrusted with the execution of the works, Messrs. Habershon & Pite obtaining the premium for the second, and Messrs. Deane & Yeoman that for the third.

Agricultural Hall Company.—The directors of this company having determined to erect a new hall for concerts, dramatic entertainments, and so on, invited a limited number of architects to compete for the design, and the following is the result:—Mr. Peck, the original architect of the hall, to have the work, under certain restrictions; first premium to Mr. Knightley; second, to Mr. Giles.

THE HERALDS' COLLEGE, LONDON.

CONSEQUENT on the formation of the proposed new street from the Thames Embankment to the Mansion House, a small portion of Heralds' College (not the whole, as erroneously supposed,) has been taken down, and a new front to it is now being formed. In doing this, the Lion and Unicorn that had long done duty there were placed upon the ground. The accidental position given to them shown by the sketch, led to the following *jeu d'esprit* by one whose initials will be recognized beyond heraldic circles. The writer terms it—

UNSUPPORTED SUPPORTERS.

THE Lion and the Unicorn,
Who deign'd, till very lately,
The Heralds' College to adorn,
On pillars tall and stately,

Unceremoniously, one day,
Were hoisted from their stations,
And on the pavement left to stay,
Pending the alterations.

The Lion sadly wanted *or*,
The Unicorn lack'd *argent*;
Clearly they 'd ne'er been thus before
"*Depicted in the margent.*"

It therefore seem'd of the offence
A serious aggravation
That folks with arms of less pretence
Obtained full compensation,

While they, supporters of the Crown
For centuries, unaided,
Who had graced standards of renown,
Were to vile *flags* degraded.

The Unicorn, in language strong,
The Lion laid the blame on:
"Without a growl to bear this wrong
A blot will be your fame on.

If of us quadrupeds you were
The king, or e'en the regent,
You would be *rampant*, not beg there,
Like a tame poodle—*sejant!*

As *dexter* 'tis your right to make
Them equal justice minister;
If I should up the matter take,
They'd call the motive *sinister*.

The British Lion, you! My brain
Whirls round, it so provokes me!
For half-a-crown I'd break my chain,—
My collar almost chokes me!

'*Dieu et mon Droit*,' no longer may
You boast as your proud motto;
'*Adieu, mon droit*,' you 'd better say,
And join Parkins & Gotto." *

So saying, like a vicious colt,
To cut the matter shorter,
He made a sort of demi-volt,
And rump'd his co-supporter.

The Lion winced at the last sneer,
But only gave a whistle,
And said, "My ancient friend, I fear
You 've trod upon your thistle.

The motto you to England brought—
Excuse me, comrade, if I sigh
To find you set it now at nought—
Was 'BEATI PACIFICI.'

Prithee don't let the Heralds see
Us, thus '*addorsed*,' good brother,
When we in every sense should be
'*Respecting one another*.'

In youth I'm willing to admit
More '*combattant*' was I, sir;
But then I'd much more pluck than wit,—
I'm older now and wiser.

I can complacently repose
Beneath my well-won laurels;
And mean no more to poke my nose
In everybody's quarrels.

Nor does it suit my present views
To roar for every trifle:
I've got—and can, if need be, *use*—
But won't *strain* my new rifle.

You seem to have forgotten quite
The world's in constant movement;
And neither King's nor Lion's might
Can long repel improvement.

London of a new street had need,
And heralds by profession
Were bound to lead, and not impede,
A grand public procession.

The posts we held were on the go,
And fallen soon had seen us,
We had nothing to support, you know—
Not one poor coat between us.

But re-installed in the new court,
And gay with paint and gilding,
We shall our dignity support
With that of the whole building.

Facing a street so broad and fine—
When to our seats we've vaulted—
My crown will cut a greater shine,
Your horn will be exalted.

So blazon not a long dull roll
Of bickerings and bereavements,
Display the power of self-control—
The greatest of *achievements*."

'Twas all in vain: the Unicorn
Was deaf to explanation,
And, with a toss up of his horn,
Declined more conversation.

J. R. P.

* *Soi-disant* "finders" of arms.

SOCIETY OF PAINTERS IN WATER COLOURS.

THE sixty-fourth exhibition by this Society consists of 297 works, and, as usual, a large proportion of them are very charming. It cannot, however, be called one of their best. The figure subjects are even fewer than usual, and none of the members are at their highest. We are not surprised therefore to hear that the sales, though numerous, are not at present up to the average. Let us note a few of the pictures. 8, "Sans Peur et Sans Reproche," John Gilbert, is a spirited Mediæval group, but does not tell its story. The foot of the knight, with full remembrance of what armour is, is obtrusively large. 12, "Wild Foul, a Flight—Winter," Frederick Tayler. The fowl are full of life and movement, but the aspect of the scene is hardly that of winter. 20, "Rahab (miscalled in catalogue Rachel) Awaiting the Coming of Joshua," F. T. Shields, is the picture of deepest interest in the room. The head, a little too masculine, perhaps, is full of anxious thought: the holding to her of the "line of scarlet thread" cleverly tells what is going on in her mind. 41, "Secondary Colours," G. Rosenberg, a marvellous representation of plums, apricots (the latter a little too yellow), and mossy rocks. In 166, "September," this artist gives another remarkable example of his power of representation. 48, "Monte Rosa from the Riffel," W. Collingwood: a rosy mountain indeed, but for all that an occasional truth. 57, "The Return from Fairy Land," T. R. Lamont. The Ettrick Shepherd's

"Kilmeny, Kilmeny, where have you been?"

will be remembered. The mother opens the door; the father stays from chopping wood at the ingle; the maiden, with her lap full of roses, is entering. The figure of Kilmeny is so charmingly pretty that one omits to look at weaker parts of the picture. 61, "The Wanderer," Margaret Gillies, has none of the sickly sentimentality that is to be found in many of this clever lady's pictures: it is an excellent work. 64, "Hush!" Walter Goodall: the baby charmingly portrayed. 68, "Harvest Time at Stoke Fleming, South Devon, looking over Slapton Sands to the Start Point," Collingwood Smith: a capital landscape. The same may be said of 78, "The Mull of Cantire," Francis Powell (the ripples tipped by the setting sun), 93. "A Towered City" (solemn and grand), Samuel Palmer; 96, "Laid Up for the Night—on the Thames," J. J. Jenkins. 107, "Morning," Thomas Danby; 114, "Buttermere—Sunrise," S. P. Jackson; 139, "Over the Hills and Far Away" (with its winding hedge-bordered road), F. Smallfield; "Salzburg" (beautiful Salzburg), Sam. T. G. Evans; and Mr. Newton's large drawing, notwithstanding some commonness in the foreground; 144, "Denbigh Castle," David Cox, jun., and 171 by the same. 165, "Interior of St. Stephen's, Vienna," Samuel Read, looking west, must have special praise; it is one of the finest works of its kind that has been seen for some time. 180, "Oxen Harrowing—Sussex," Basil Bradley. Eight long-horned beasties are pulling a little harrow over mild furrows, a large apparatus for small work. An eminent agriculturist, standing by, maintains that the majority of the oxen must be one hundred years old: it is a clever picture nevertheless. 219, "Fair Daffodils," F. Smallfield: a sweet human face, though the soft blue eyes do not both look quite the same way. 162, "Ave Maria," Walter Goodall; 248, "The Ship's Model," J. D. Watson; and 213, "Well-Sinkers," Frederick Walker,—all call for mention, especially the latter, which is an exquisite drawing.

ST. THOMAS'S HOSPITAL, WESTMINSTER BRIDGE.

THE first stone of the new hospital which is about to rise on the southern side of the Thames, opposite the Palace of Parliament and adjoining the end of Westminster Bridge, was laid on Wednesday last by her Gracious Majesty the Queen. A brilliant sun contributed to success. The road from Buckingham Palace to Stangate was lined with a loving people; and in a very commodious, well-ventilated, and handsome pavilion, erected over the site of what will be the chapel of the hospital, some 3,000 of the more distinguished of them received her Majesty with long-continued plaudits, and watched with interest the short but interesting ceremony. We may say briefly that the interior of the pavilion was planned somewhat after the model of a theatre, with that part which would be occupied by the stage screened off as a reception-room. That portion of the interior space which, in a theatre, might have been the orchestra, pit-stalls, and pit was reserved for the ceremony. All this enclosed space was of one crimson hue. The tall barricade that swept round the arena was painted of that colour, the same to a shade as the crimson carpet and the crimson hangings of the long screen, against which was the crimsoned-covered dais. Four crimson poles, converging to an apex which was crowned with a cluster of flags, stood in the centre of the floor; and from their midst depended the square and polished block shortly to be lowered on a base, which was covered as to its sides with crimson cloth, while two crimson pedestals were at hand, to support the trowel, mallet, plumb-level, and other implements. On the crimson dais was spread a Persian carpet; and gilt chairs with crimson seats were ranged for the royal party, a throne being in the centre. Above was suspended a blue canopy, surmounted by a gilt crown, and having the same emblem repeated in flat gold broidery round the border, at intervals with the letters "V. R." Banks of flowers were ranged round the arena, and the embellishment was completed by a pair of royal standards, of long lozenge form, one on either side the canopy. [The canopy was arranged by Mr. J. G. Crace, and with his usual good taste.] It is unnecessary for us to describe the ceremony, but we may say that to an address that was read by Sir John Musgrove, as President of the Hospital, the Queen returned, but did not read, this reply:—

"It is with sincere pleasure that I lay the first stone of the noble buildings which you are about to dedicate to the use of the sick and suffering poor. The hospital of

St. Thomas, founded by my royal predecessor, Edward VI., from the services which it rendered to humanity, naturally attracted the attention of my beloved husband, whose heart and mind were ever interested in institutions of so beneficial a character. It is a solace to me to follow his example in promoting the objects which you have in view, and I trust that your hospital, upon its new site, by the various improvements which experience and sanitary skill may suggest, will secure increased benefits to its suffering inmates, and provide an admirable school for nurses, and for the promotion of medical and surgical science. I thank you for the loyal and sympathising expression of your feeling on the late attempt to take away the life of my dear son the Duke of Edinburgh, and join in your prayers that the same good Providence which preserved him from the assassin will soon restore him in health and safety to his family and country."

The trowel used was made for the occasion by Messrs. Howell, James, & Co. The handle is of carved rock-crystal, inlaid with scrolls of gold and turquoises, surmounted by the Imperial Crown, in chased gold, set with precious stones, the arched diadems being jewelled with pearls. The blade is silver, with elaborately engraved and gilt arabesques of Italian ornament, and bears the following inscription:—

"This trowel was used by her Most Gracious Majesty the Queen in laying the first stone of St. Thomas's Hospital, May 13th, 1868."

[The "stone" is a polished block of granite from the Dalbeattie quarries, N.B.]

Mr. Tite, M.P., was prominent amongst the acting governors of the hospital.

The building, as our readers know, is to be erected from the designs of Mr. Henry Currey. A view of it, with plans and descriptive particulars, will be found in our volume for 1865.* The contractors for the works are Mr. Webster and Mr. Perry. The clerk of the works is Mr. Andrew Cleland.

Florat Hospitium Sti. Thomæ!

MR. PARKER IN ROME.

A LECTURE was given by Mr. J. H. Parker at a late meeting of the British Archæological Society in Rome, on the Direction and Extant Remains of the Servian Walls. It might be considered as sequel to another on the Construction of Ancient Roman Buildings, given some time previously by the same gentleman on a similar occasion. Mr. Parker holds some theories that are novel, and opposed to those hitherto accepted by Italian archæologists. An excursion, with the object of visiting *in situ* the antiquities referred to in the lecture, was arranged for the following day, and participated in by a numerous party, who enjoyed the advantage of receiving explanations at the several spots they were conducted to from the lecturer. We may report, briefly, the experiences of that pleasant and instructive day, dedicated to such studies among ruins of remarkable character, but by no means among those most generally visited, or understood, by tourists at Rome.

Important and picturesque remains of the Servian fortifications have been brought to light within recent years, and in most instances as it were accidentally, through works undertaken without any antiquarian purpose. Ancient historians differ in their accounts of the circumscribing of the city by that cincture of walls to be attributed to Servius Tullius, and which formed the sole fortification around the earlier inhabited regions during about 800 years—namely, till Aurelian raised the much more extensive circuits, A.D. 271, which, as restored, and perhaps amplified, by Honorius, A.D. 403, forms the actual girdle of defences to this city, in many parts, indeed, rebuilt by the Popes, to whom is due the entire cincture on the Transtiberine or right bank of the river. Dionysius states that the Quirinal hill was first annexed by Numa, the Viminal and Esquiline by Servius; so also Strabo; but Livy ascribes to the latter king the fortifications that included first the Quirinal, afterwards the Viminal, and finally the Esquiline; the project of which works had been originated by his immediate predecessor, Tarquinius Priscus, who was prevented from accomplishing it by the wars with the Latins and Sabines; a second time undertook it, but in vain, shortly before he was cut off by violent death (Liv. l. 1, c. 36, 38). It is possible to reconcile statements that seem contradictory (and for the argument on this subject see Nibby, "Roma Antica,") by assuming that Numa annexed some portion only of the Quirinal, Servius the remainder of that hill, and that Tarquinius Priscus *commenced* the works completed by his successor, though one writer, Aurelius Victor, ascribes the whole to the former king, except that Agger, with its system of fosses, which all (Pliny alone excepted, who calls it the Agger of Tarquinius) agree in ascribing to Servius. Dionysius, the fullest in describing what he had seen when he visited Rome, about the year 30 B.C., observes how insignificant was the extent of these walls compared with that of the then inhabited city under Augustus, adding that it was difficult to trace their complete circuit, concealed, as they then were in many parts, by other buildings, and that the entire circumference seemed to him not much greater than that of the walls of Athens — namely, 60 stadia, or 7½ Roman miles—a few hundred feet less than the ascertainable measure of these Servian defences.

The first spot visited by the party under Mr. Parker's guidance was the Barberini vineyard, on the northern slope of the Quirinal, and in the valley between that hill and the Pincian, site of the beautiful gardens of Sallust, which eventually became a more important centre, chosen for imperial residence, the favourite seat of several emperors, especially of Aurelian. Here, on the steep hillside, are seen a few courses of antique masonry in lithoid tufa, partly hidden by vegetation, but recognisable as of early Roman work; and from the highest ground we discern the elevation of the Agger, extending southwards, in part overgrown by trees, at one point cut off by the Via di Porta Pia on the Quirinal, its course now traceable through private properties. The ruins next visited are in what was formerly the gardens of the Villa Negroni (where dwelt Alfieri), now the premises of the railway station. Here, in the course of railway works, were found, some years ago, the massive substructures of walls in square-hewn blocks, the same lithoid tufa, some of the length of 2·70 mètres, the direction oblique, the whole having been buried under a steep bank, evidently a part of the earthworks by which the Agger was supported on the inner side. At the same time were discovered the remains of a gateway, with jambs of ponderous masonry, at once identified as the Porta Viminalis, but which, with strange neglect, was allowed to be demolished—one of the instances of that Vandalism which has not totally ceased in modern Rome! A pleasant spot, notwithstanding utilitarian appropriations, and on every side commanding fine views of city and country, is that estate once of the Negroni Villa. Here, too, are other antiques, brought to light within late years,—chambers of ruined mansions, built against the bank of the Agger, and on their inner walls are seen, in colouring still fresh, paintings that remind of Pompeian decoration. Those courses of ancient stonework have been numbered, so that each block may be distinguished, and plunder rendered impossible without detection. From hence we proceeded along the little-frequented region between the Viminal and Cœlian hills to the lower level, where stands S. Clemente, beneath which church, when the more ancient, now subterraneous to the more modern building, was re-opened, an extent of walls in square-hewn blocks of lithoid tufa, with a kind of cornice in travertine of still larger masses, was found beneath the chancel of the primitive church, flanking a narrow passage, the opposite side of which is formed by the regular brickwork of a Roman mansion, believed to be the house of the Pope St. Clement III., successor to St. Peter. If, as seems inferable from their character, these walls be indeed a part of the Servian, that cincture must have taken a direction bending inwards from the south-eastern side, and advancing into the Subura (where S. Clemente stands), which no theorists have hitherto assumed, the accepted maps of the ancient city placing the line far from this spot, and nearer to the Lateran basilica. The southern slopes of the Cœlian were next visited, and from a solitary road, along which rise the picturesquely ruinous arcades of the Neronian Aqueduct, we struck off into vineyards and gardens, amidst which it is almost certain that the Servian walls must have passed, though no traces of them be now visible. But other ruins, picturesque and noticeable, little known because not seen from any highway, will here repay the trouble of exploring: the most conspicuous, those of a mansion popularly called "House of Seneca," and in masonry resembling that of the time of Nero, the principal portion, a vaulted chamber in well-preserved *opus reticulatum*, intermixed with layers of lateritial work; near this, close to a garden-house, a vaulted recess, into which we look down from the shelving back that now obstructs the entrance; and further off (in another estate) an edifice, against the hillside, called the "Nymphæum of Alexander Severus," a good deal like that mismamed "Grotto of Egeria" which is such a favourite with tourists and sketchers in spite of all to be said against its pretensions; this building having its lateral walls adorned with niches, no doubt for statuary, and its fountain from a stream of crystal waters still visible in a conduit, with a ruinous opening and vault on the hillside; that fountain no longer gushing into its marble basin, but left to flow in darkness; the vaulted roof no more protecting the desolate hall; the inlaid pavement torn off, weeds and long grass growing in its place, nothing spared by time; but what is left, still beautiful in decay, and sufficing to give an idea of the attractiveness of such a retreat on this Cœlian declivity, whence is enjoyed one of those views never to be forgotten by those who have loved and been familiar with the fascinating scenes of Rome! Still more than at the pretended Egerian Grotto has Nature *here* fulfilled, by her own reclaiming power, the wish of Juvenal in regard to that haunt of the enamoured goddess:—

"Quanto præstantius esset
Numen aquæ, viridi si margine clauderet undas
Herba, nec ingenuum violarent marmora tophum."

The labours still in progress at S. Angelo in Piscaria, the modernised church built under the portico of Octavia, have not only uncovered much that had been hidden of this classic ruin, but also made accessible several remnants, in a crypt, of the Servian structures, not only in different low courses of the usual stonework, but more conspicuous elevations, one behind the subterranean story of the church, the other within it, under the chancel, and here describing the segment of a wide semicircle; these two more considerable portions of the same walls being on parallel lines at some distance, that may have been connected by some curtain of masonry at an angle with both, and suggest the idea of a tower or projecting bastion.

From these grounds we descended to the level of the Appian Way, and, at a point nearly opposite to the Antonine Thermæ, entered gardens at the southern side of the Cœlian, below the height crowned by the pleasant Villa Mattei, one of the ascertained directions of the Servian walls, near the Porta Capena, being on this line. No Servian structures are seen here; but such antiquities as we found on these cultivated depositories are indeed curious; and most interesting is it to consider, with Mr. Parker, that a ruin with walls at two sides of an angle, in *opus reticulatum*, thrown up against the hill, may be no other than the Temple of the Camœnæ, near the Valley and Grotto of Egeria, the real site of which we may confidently place in these low grounds under the Cœlian, at a short distance from the Capena Gate. Another remarkable structure here, on the same hillside, has been for the first time brought before public notice by Mr. Parker, who identifies it as a portion of the Appian Aqueduct, — an arched conduit, partly excavated, partly built, the masonry of brick and reticulated work mixed, into which we could enter at the cost of not easy scrambling over heaps of soil and *débris*, and beyond the outer compartment could reach three inner cells, now quite dry, but showing the action of water in petrifactions on the vaulted roof.

Much more imposing is another specimen of the Servian walls, accidentally discovered in a vineyard of the Jesuits (now of Prince Torlonia), on the highest level of the Aventine, in 1851. Entering these grounds from a solitary road opposite S. Prisca, we find two elevations of the same massive masonry, in square-hewn stone courses, both of considerable height, and one looked down upon, as if in a well, from the level of the cultivated soil under which it had been so long buried. At about the centre of the more conspicuous portion is an ample archway of travertine, in front of which advances a curtain of similar masonry, blocking up the egress by what must have been a portal of later addition, and which Mr. Parker assumes may be as ancient as the time of Camillus, about B.C. 360. The other fragment seems to belong to a massive square tower projecting from the cincture. On another part of the Aventine, in the gardens of the S. Sabina Convent, were found, some years ago, not inconsiderable remains of these walls, built up in the chambers of a mansion (probably patrician), which we saw soon after the dis-

* Vol. xxiii., p. 526.

covery, but which are now again withdrawn from view, the Dominican friars having wanted means to continue the excavations, and therefore allowed this interesting relic of Rome under her kings to be lost to modern citizens and students.

A stupendous structure of peperino in regularly-hewn blocks, divided by cornices of travertine into three stories, and in its highest part rising 90 ft., in its extent between 200 ft. and 300 ft., with four arched entrances now walled up, and another still open, but half buried in the ground, called *Arco de' Pentani*, has been hitherto considered nothing else than the massive enclosure to Augustus's Forum, preserved only on this the eastern side, near the base of the Viminal; and the beautiful ruin of a colonnade, which abuts against this building, passes for the Temple of Mars Ultor, the principal edifice in that Forum.* But Mr. Parker maintains that these very imposing walls also belong to the Servian cincture, and that the half-buried *arco* is, in fact, one of the city gates; nor, indeed, can it be disputed that the character of fortification manifestly appears in those immense ruins beneath the Viminal. The different dates of their origin must be inferred when we observe one side, at an angle, only seen in a narrow court behind a *caffé*, where the upper part presents a surface so worn by time as to resemble rugged rocks rather than masonry; but the lower, in similar stonework, is compact, smooth, and well-preserved, like a building comparatively modern; this, we may suppose, being a restoration of the older structure. The same origin is assumed by the learned archæologist for some other remains, of similar stonework, now built up in two sides of the ponderous brick tower, a huge unsightly pile, that rises in gloomy decay not far from the above-named walls, and which is all left of the once extensive castle of the Conti, built for the family (or, according to some writers, restored from an original of the ninth century) in the latter years of the twelfth century by Innocent III., the most illustrious son of that house. Canina referred those ruins within the Conti tower to the Temple of the Sun and Moon; others to that of Tellus; but, seeing the fortress-like character both of these and the ruins of the Augustan Forum, we must avow a disposition to agree with Mr. Parker in fully endorsing his opinion. A similar structure, referred by German writers to the Forum of Julius Cæsar, forms a curtain-wall behind the half-buried columns and beautifully-sculptured entablature of the Pallas temple in the "Forum Transitorium," begun by Domitian and completed by Nerva, a singular detail being the archway, filled up with corresponding stonework, placed at a point not central between the columns that flank it, and therefore evidently foreign to the plan of the later-raised portico that surrounded Minerva's temple. In this example, also, Mr. Parker points out a recognisable remnant of the Servian structures. Another undoubtedly of the same origin, but much less conspicuous, which we believe Mr. Parker has been the first antiquary to notice, is found near the Tiber bank, at the foot of the Aventine, within enclosed ground between the river and the archway called *Arco della Salara*, supposed to represent in modern form the Porta Trigemina. Less picturesquely situated, though on the classic ground of the Tarpeian Rock, is another relic of the old king's works for defence, in a few courses of quadrate peperino blocks, now encased in brickwork, on one side of a dark corridor leading to a wash-house off the *Via di Monte Tarpeia*, on the highest level above that now disappointingly insignificant precipice,

> "whence the traitor's leap
> Cured all ambition."

It may be problematical, but is admitted by authorities, that some buttresses of lithoid tufa beneath an upper story of brickwork against the steep of the Quirinal in the Colonna gardens are also to be referred to Servius; and we cannot doubt that some other similar stone courses laid bare in the recent levelling for the ascent to the Papal palace on that hill, but soon afterwards swept away, were likewise of Servian origin,—their loss, therefore, to be regretted. We have now completed our survey, in an exploration none can have made without bearing away things to remain in memory, and not only to delight the antiquary, but also the lover of nature—indeed, all who have eyes for admiring such solemnly beautiful scenes of ruin and landscape as the Eternal City abounds in.

* We are inclined to agree with Nibby in rejecting this popular notion, and considering those Corinthian columns as the Temple of Nerva, dedicated to his adoptive father by Trajan; the church of S. Martina, near the arch of Septimius Severus, having better title to occupy the site at least of the temple of the Avenging Mars, which is represented on medals as circular. The Roman archæologist above named is contented to observe the obviously higher antiquity of those contiguous walls, without determining their date.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS, NEW YORK.

SOME ten or a dozen years ago a charter of incorporation was granted by the legislature of the state of New York for the formation of the "American Society of Civil Engineers." Mr. James G. Laurie, the first president, had the credit of its origination, and many of the most noted engineers in the country were enrolled among its members. Lack of funds, however, prevented the society from establishing permanent head-quarters; and interest in its proceedings gradually failed, until finally the society existed merely in name, and in the memory of its members. Last fall, however, some of the old members revived the old society on a new basis. The first meeting was held last December, and Mr. James P. Kirkwood was elected president, with Col. Julius W. Adams as vice; while Mr. James O. Morse, the original secretary of the old organisation was still kept in office. At this meeting the president dwelt especially upon the importance of professional papers and communications, as being essential to keeping up an interest and life among its members. It is hoped to do much by means of this society towards educating the American public in the idea that engineering is not a trade, but a learned profession, practised by gentlemen. At the January meeting a full attendance showed the interest felt, and a paper was read by Mr. Craven, "On the Breakage of some of the enormous 10-ft. Mains of the Croton Aqueduct." A communication was read by the secretary, Mr. Morse, from Mr. McAlpine, upon the subject of corrosion of cast iron immersed in sea-water. He is of opinion that cast-iron piles are not subject to any corrosion whatever, if the ore from which the iron is made is properly selected.

PARR & STRONG'S CELLULAR FIREPROOF CONSTRUCTION.

WE have illustrated in our present issue an entirely new mode of building which has been invented and patented by two architects, Mr. Samuel Parr and Mr. Alfred Strong. Its friends say it is Strong and above Par; and we hope it will turn out to be so.

In this system of building, short tubes are substituted for bricks,—tubes made of clay, terra-cotta, metal, or any other suitable material. They may be of any shape, but the hexagon shape is best adapted for general use. The tubes are laid transversely in the wall, and the thickness of the wall is made up of tubes all one length. In external walls, the tubes are partially filled at one end with concrete made of Portland cement and ballast; and the concrete may be faced with plain Portland cement or pieces of stone, iron slag, flint, &c.

An ornament of cement, terra-cotta, or metal may be fixed to the end of the tube, and backed up with concrete if necessary.

The other end of the tube forming the internal surface of the wall is covered with a *plain tile of hexagon shape*, the same size as the tube, and with a rim fitting the inside; or the internal surface may be formed by fixing a tile inside the tube, and covering it with concrete or plastering, according to the surface intended to be formed.

In all external walls it is intended to leave a cavity or air-cell between the materials forming the internal and external ends. For the internal walls and partitions surfaces may be formed, as above described, for the internal surface, leaving the tube quite hollow, or the tube may be partially filled or the whole tube may be filled with concrete. In the sides of the tubes it is proposed to make holes for the insertion of dowels or rods to unite the tubes vertically, horizontally, or diagonally.

The patentees propose further to construct roofs and floors with tubes, hexagon in shape. The tubes for this purpose are laid with their sides at right angles to the surface of the roof or floor, and are united with cement and dowels where necessary. The surfaces are formed by covering the tubes with flat or spherical covers united with cement, and the spaces between the covers are filled in with cement; or an entire surface is formed over the whole of the ends of the tubes with concrete.

The patentees point out the value of the cavity or air-cell in the tubes as making the wall weather-proof, and claim, amongst other advantages, that the work, when united with dowels, rods, or tie-bolts, is very strong; that, the tubes being perfectly dry when built in the work, the walls are dry when finished, so that the joiners' work may be fixed without delay; that the tubes being made of equal lengths and the internal surface true, a thin coat of plastering is all that is required to complete it; that walls can be built very rapidly, and have the same solidity as masonry; that, the joints being all equal, no irregular settlements can take place, and no rubbish can be built in the wall; that backing to stone walls can be executed without staining the stone, and the internal surface will be dry when the wall is finished; that alterations can be made in the walls and openings formed with safety without shoring or needling; and that arches can be formed with the tubes without cutting or waste.

Where great strength is required, as in the case of warehouse walls, a system of solid piers and arches can be formed in the work by filling the tubes with concrete, and the piers and arches may be further strengthened by the introduction of iron dowels, rods, or bolts. King-and-queen post-trusses can be formed in the walls with cast-iron hexagons and wrought-iron bolts, thus avoiding the necessity for iron girders.

Embankment walls can be built with rapidity, and without injury by the wash of the tide. Vertical bolts being fixed in the walls, the landties are concealed and secured from injury.

Saving of space may be effected by the adoption of thin walls.

For half-timbered houses it is proposed to fill the framing with short tubes and line the inside with tiles (flat), leaving a cavity at the back of all timbers to allow for shrinkage, &c.

With reference to cost, it is stated that, taking all things into consideration, this mode of construction is cheaper than brickwork.

The area occupied by each tube inclusive of joint is 1 ft. superficial, thus greatly facilitating the task of calculating the number required for any given wall-surface.

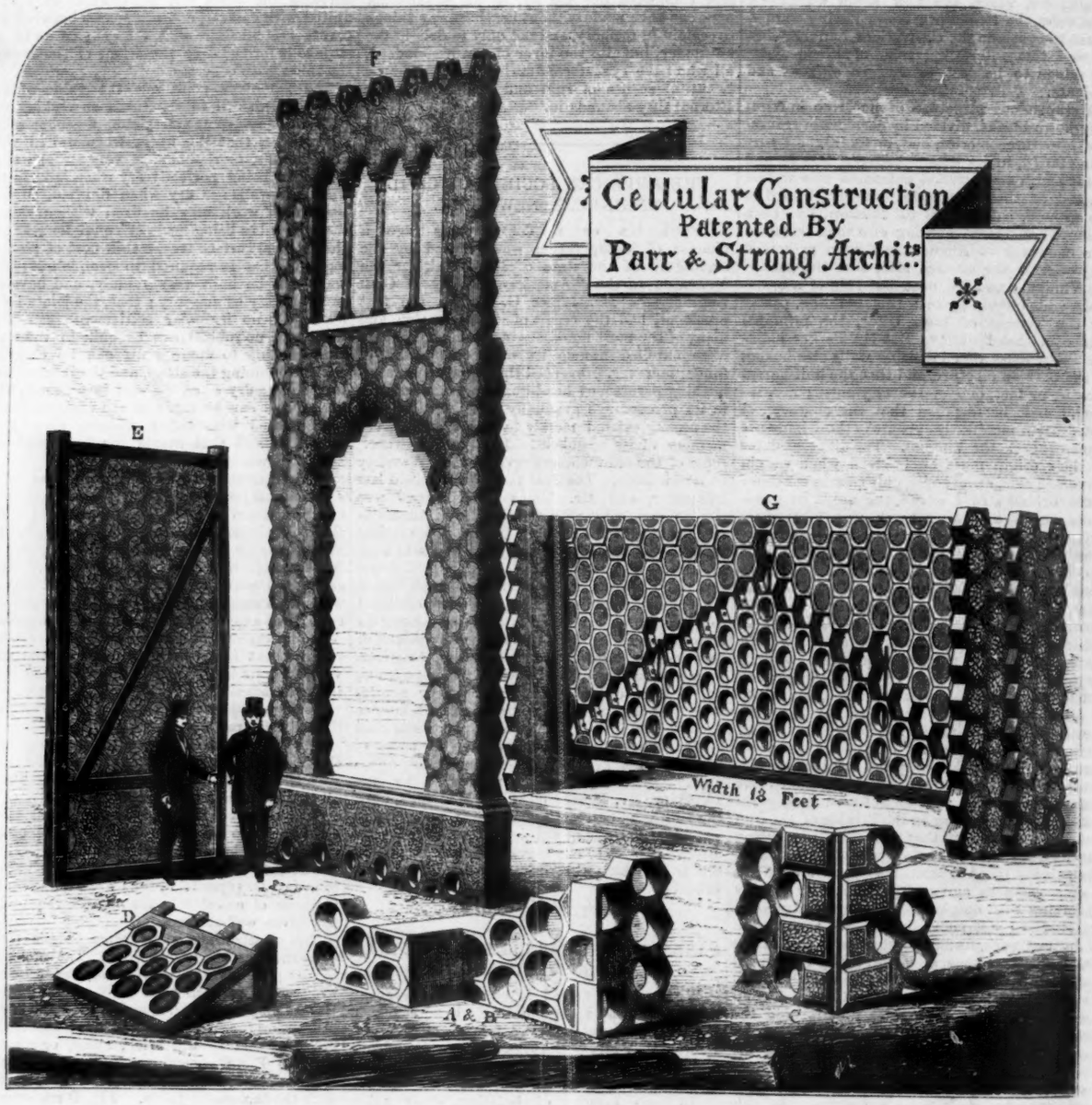
The illustrations show some details of the constructions above described. The upper half of the page gives a view of some experimental works in the unfinished hall of the Strand Hotel Company. Figs. A and B show the method of forming breaks and exterior angles where it is not desirable to use brick, stone, or concrete quoins. Fig. C shows an exterior angle of terra-cotta or stone, and the method of uniting them with the hexagonal tubes. Fig. D represents a portion of a roof in its various stages of construction, the rafters, the lathing or rough boarding, the hexagonal tubes, and, lastly, the spherical covers. Fig. E exhibits a portion of half-timbered work, the tubes in the lower panel being filled with flint, those in the upper panels with granite. Fig. F stands 27 ft. high, and is built in three thicknesses. The plinth is 14 in. thick, the piers on either side of the arch are 9 in., and the remainder is of 4-in. tubes. The first row has been left empty, to show the strength of the tubes, whilst the others are filled with about 4 in. of concrete.

Fig. G is a truss with a clear space of 18 ft. between the piers, one of which is 6 in., the other 9 in. thick. These piers were erected (of tubes), by one man, at the rate of 1,700 bricks a day (9-in. work). The truss itself is composed of cast-iron hexagons, bolted together, and the king and queen posts are of wrought-iron, and pass through the ordinary tubes, which are 4 in. thick.

The lower half of our illustrations shows sections of various modes of forming the ends. In figs. 1 and 2, concrete and cap are used; in fig. 3 caps only; and fig. 4 shows two cells, divided by a wall of concrete. The next ten figures exhibit the chief forms necessary in this system of construction, the chief form being of course the hexagon, whilst the others are required only occasionally.

The bottom row of window openings shows the effect of *massing*, the capability for architectural treatment, and the ease with which any required width may be obtained.

A visit to the locality we have indicated will well repay those interested in new methods of construction.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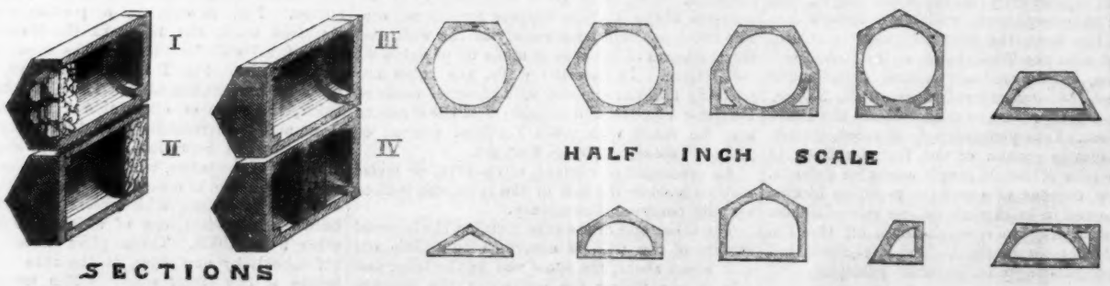
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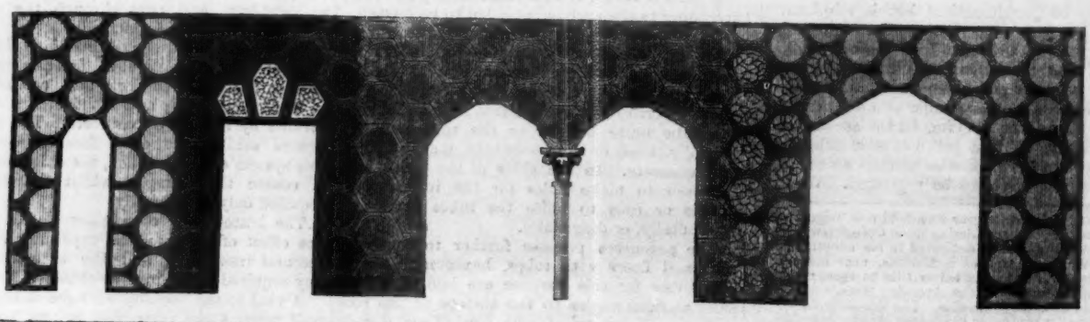

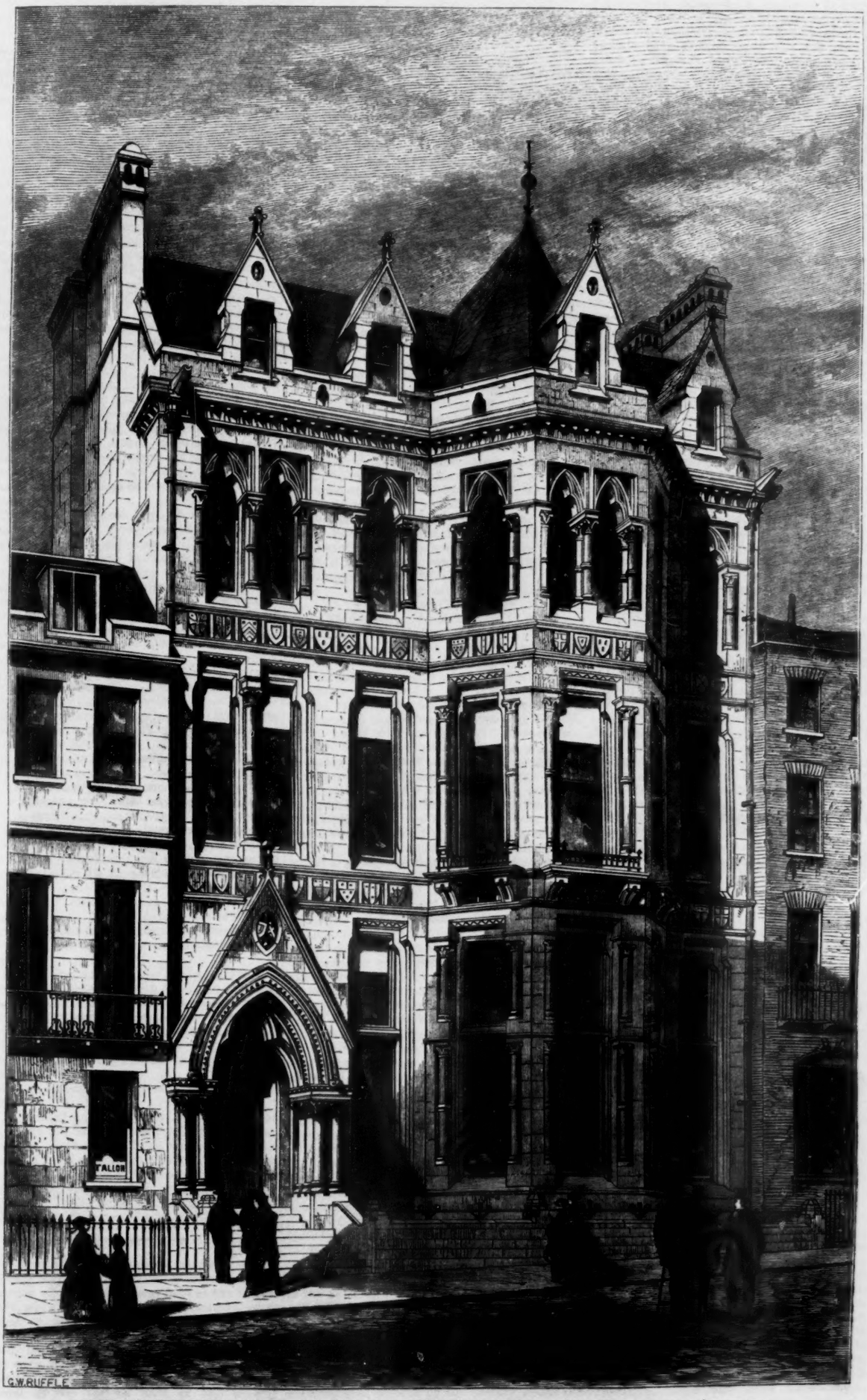

NEW UNIVERSITY CLUB. ST. JAMES'S STREET FRONT.—Mr. Waterhouse, Architect.

THE NEW UNIVERSITY CLUB, LONDON.

THE New University Club was founded in the year 1864 by various members of the Universities of Oxford and Cambridge, who, finding that at that time it was necessary for a candidate's name to have been from eight to ten years on the books of the two older University Clubs before he could expect to come on for ballot, thought that the establishment of a new club, which would absorb the numerous members of the two Universities who were then waiting and desirous to get into the older clubs, would meet with success. The result seems to have justified this expectation. The New University Club opened in St. James's-street in May, 1864, with 500 members. This number has now increased to 950. Early in 1865 it was determined to build a new club-house, capable of accommodating 1,000 members, and to that end the houses at the back of the St. James's-street property, having a frontage in Arlington-street, were purchased, and as soon afterwards as practicable the whole site was cleared and the new house commenced. The works are now nearly completed, and it is intended to open the building on the 25th inst.

The St. James's-street front, which we illustrate in our present number, is constructed wholly of Portland stone. Between the double string-courses at the level of the first and second floors shields are carved, bearing the arms of all the colleges and halls of both Universities.

The Arlington-street front is built of white brick and Portland stone, and has only a basement entrance for tradesmen.

The principal rooms in the building, looking into St. James's-street, are the morning-room, somewhat octagonal on plan, about 40 ft. by 35 ft., and 22 ft. high, with a large bay window on the ground floor; the drawing-room, about 45 ft. by 32 ft., having a bay window also, occupying the whole of the frontage on the first floor; the smoking-room, over the drawing-room, and about the same size, having an open but covered balcony in continuation of the bay windows of the rooms below.

Looking towards Arlington-street, there are, on the ground floor, two coffee-rooms, the larger one 48 ft. by 27 ft., and the smaller 27 ft. by 19 ft.; above the larger coffee-room the library, and above that two billiard-rooms.

The staircase, and the retiring-rooms, lavatories, dressing and bath rooms, serving-rooms (one on each floor), are arranged in the centre of the building; as also the strangers' dining-room, on the ground floor, 27 ft. by 20 ft.; secretary and clerk's office, first floor; and card or committee room, 19 ft. by 15 ft., on the second floor. A well-lighted corridor, 10 ft. wide, on each floor connects the rooms looking into St. James's-street with those fronting Arlington-street.

The attic floor is appropriated for the servants' bed-rooms, and the basement for the numerous offices.

The building is "fireproof" throughout, the floors being constructed with Phillips's wrought-iron joists and laths filled in with concrete, and carried up by wrought-iron girders, the soffits of which are visible in the various rooms.

The Portland stone staircase is carried on wrought-iron girders, the whole of which are visible.

The principal rooms are lighted by sun-lights.

The general contractor is Mr. W. Brass. The decoration has been executed by Messrs. Heaton, Butler, & Bayne. Mr. Boyd has carried out a system of iron flue-plate ventilation, and supplied the kitchen apparatus and grates generally. The stone carving has been done by Messrs. Farmer & Brindley. The cost will somewhat exceed 20,000*l*. Mr. Waterhouse is the architect.

SHEFFIELD ARCHITECTURAL SOCIETY. — On Thursday last week, the monthly meeting of the members of this society was held at the School of Art, when the Rev. J. Stacey exhibited some ancient celts or rude spear-heads of flint and stone, a bronze javelin-head, a rapier-blade, and sword, and several celts of the same metal. They were all found in Limerick and other parts of Ireland. The rev. gentleman gave a detailed account of the various uses of the several objects. Mr. Fawcett read a paper on "St. Robert of Knaresborough," giving an account of his cell and rock-cut chapel.

THE DISINTEGRATION OF ROCK FOUNDATIONS.

JERUSALEM.

IN the course of the discussion at the Institute of Architects, after the reading of Mr. Grove's paper "On the Exploration of Jerusalem," a question was raised to which increased publicity may be usefully given.

Mr. C. Barry said: Mr. Grove has interested us very much by the details of these explorations which he has brought before us, and I have no doubt the effect of his paper will be to add to the number of subscribers among the members of this Institute, as well as to the interest which he seeks to excite in these proceedings. But in order that it may be done intelligently, I think it would be very desirable that he should give us some of that practical information which we want in dealing with money. He has given us a description of what has been already done, and he has told us the amount of funds he has in hand; he has also intimated that in the course of ten or twelve months that fund will be exhausted; but he has not told us how much the expenditure has been in making the series of discoveries which has been described, nor has he given us any idea of his own and Mr. Warren's anticipations to what extent the present funds will carry them, assuming they go on as satisfactorily as they have begun. It would be interesting to know whether they can form any idea of the amount that may be required, and the time over which the explorations may last if they are carried to a sufficient extent for the perfect elucidation of the Temple area. I think some definite information with regard to the amount which had been spent upon the work, as far as it has yet been carried out, will give some encouragement to the subscriptions, which I hope will receive some additions from the large meeting which we have this evening.

Mr. Grove.—I am much obliged to Mr. Barry for putting this question. The cost of the explorations which I have mentioned to-night, up to this time, has been about 1,700*l*., including the expenses of sending Lieut. Warren and two assistants to Palestine, and their pay. What further expense may be incurred is a question of how much is to be done. The present expenditure is about 200*l*., but we might advance from that to 500*l*. per month with great profit and advantage. What I should like to do with regard to this fund would be to rescue it from its present temporary and spasmodic condition, and put it on the footing of regular yearly subscriptions. I am about to propose to the committee of the fund a plan by means of which we may obtain a regular yearly income with which to go on exploring, not only Jerusalem, but other parts of the country also. I do not wish to leave out of sight that there are other departments to be explored besides the architecture and topography of Jerusalem. The geology and natural history are but very imperfectly known, and they are highly interesting and important. All I can say regarding that department which affects the Institute is, that the old city appears to be lying there beneath the modern nearly intact,—only waiting for the removal of the *débris* which presses it down.

Mr. Seddon referred to the picture painted by his late brother, Thomas Seddon, which was purchased for the nation, and is now exhibited at South Kensington. He said: It happens to represent the very locality which has been mainly referred to in the lecture, and to give the present aspect of the valley with the utmost accuracy. The character and colouring of the vast accumulation of *débris* which overlies the apparently original slope of the precipice is therein shown as having exactly the aspect of the tips from mines and quarries with which we are familiar in this country. Nevertheless, the depth of the ravine and the steepness of its banks are sufficiently striking, and from it may be gained some idea of the stupendous grandeur which must have characterized the effect, if the Temple walls were ever visible to the full extent of the amazing height which has been described, and the depth of the valley was as great as the section exhibited by Mr. Grove would appear to prove it once to have been.

Mr. Digby Wyatt.—Mr. Grove's passing reference to the fact that the illustration of the ethnology of the country is one amongst the contemplated objects of the society, opens out interesting prospects of what it may be enabled to effect in the future. The most casual observers of museums, and the most superficial students in archæology, cannot fail to be struck in contrasting the yield of the Holy Land in remains of antiquity with those art-treasures of all kinds which have teemed upon the soil of Egypt, Greece, Nineveh, Rome, and other places. On those historic sites illustrations of the mode of life, of the manners and customs, and of the peculiarities of successive dominant races seem to turn up with every square yard of virgin soil in which excavations are made; while, on the contrary, in the Holy Land, no indication whatever appears to have been as yet discovered in a tangible shape of the nature of the technical arts of the country. Hitherto no success has, it is believed, rewarded research by former explorers in this particular; and I should therefore be glad to hear in detail,—firstly, whether in the investigation of tombs, or in any of their excavations, any fragments illustrating the technical arts of the country have been discovered by the Palestine Exploration Society; and, secondly, whether those who practically conduct the work have the intention to extend their examinations over a considerable area. In going to such a great depth as that in which, judging by the diagrams, the main shafts have as yet been sunk, the sewers, the old water channels, and probably certain subterranean passages connected with the ancient defences of the city may be perfectly well investigated; but it is scarcely to be anticipated that many relics will be discovered which will throw light upon the arts and habits of the people.

Mr. Grove said—Mr. Wyatt is quite right in his remarks. Not a single weapon, not a coin, not a piece of metal-work of any kind has been discovered. It is almost as if no people of any race or kind had existed in the country. Going down to the great depth which this shaft of 87 ft. indicates, it is natural to expect that at the foot of a wall which must have been tenanted by soldiers and others for many years, some coins or other articles would have been dropped. The only things Mr. Warren has found are some small pottery vessels and two little glass bottles, and those were found, not at the foot of the wall, but in the subterranean passage from the Virgin's Fount, and they have been pronounced by competent judges to be of a date not later than the fifteenth century.

The Rev. Mr. Smyth inquired whether the filling up of the Kedron Valley was from *débris* of rock or from natural soil.

Mr. Grove replied that Mr. Warren reported it was all composed of stone chippings. It might be either the fragments from the dressings of the stones of the wall, or the *débris* which had been tipped over during the many successive demolitions of the place. Looking from the Mount of Olives, the whole of the side of the valley next to and below the wall appeared like one enormous "tip." It had exactly that form, and also was of a grey *limy* colour, like destroyed masonry.

Professor Ansted said: I should be glad to add to the stock of information on this subject more directly than I am able to do, and there are many points of geology which might have been enlarged upon, but this would not be a fit place to introduce them; but with regard to the extraordinary appearance of the chipping of stone alluded to, from what I have seen in that part of the world—though I have never been at Jerusalem—I can perhaps explain them. Those who have visited Greece, and countries where the rock is chiefly brittle limestone, readily acted upon by the weather, and have noticed the result of time on walls or buildings, will be prepared to recognise a similar result on naked rock. In many places where scarcely any buildings remain, and where there is no evidence of former civilization, one sees heaped together a vast amount of angular stones. The traveller fancies he sees the ruins of an ancient city which must have existed for centuries; but when he looks with a geological eye, with a view to make out how the result has really been produced, it is clear that all these fragments of rock are nothing but the result of the action of the weather on the great mass of the limestone itself exposed at the surface. A large portion of the buildings of Greece have been built originally of rock brought from no great distance; the old walls and buildings have served afterwards as quarries, and the result is a vast confused heap, partly derived from old buildings and partly from sub-aërial denudation. In the valley near Jerusalem there may have been fragments thrown down, and an enormous extent of artificial as well as natural destruction of this kind; but in the instance before us I think a large pro-

portion of the filling-up of the valley is in all probability the result of sub-aërial denudation.

Mr. Grove.—It has been broken up and carried. All the way down the side of the hill is formed of fragments of rock scarcely moved from the place. They have been split up and left alone. I will read you Mr. Warren's account of this:—

"The shingle is composed of stone chippings without a particle of earth, and in character almost fluid."

Professor Ansted.—That corresponds with what I have seen at Cephalonia. There there is a large quantity of material heaped by the side of the mountain, and where the angle is steep I found the mass to consist of loose shingle corresponding with the rock above, and innumerable broken fragments of limestone. All this is the result of denudation. It depends upon the angle of the slope whether the stone broken away by weathering is rolled down or left *in situ*.

Mr. C. Barry.—Does Professor Ansted wish us to understand this geological phenomenon can go on *ad infinitum*—that the surface of such rock can go on disintegrating itself, and that below an already disintegrated surface for 20 ft., 30 ft., and even 90 ft. in depth? which is here the depth of the *débris*. Because, if so, that will occasion serious anxiety to architects for the foundations of buildings which are built upon rock with perfect confidence, and without any idea that it is going to misbehave itself in this extraordinary way. I understand from Mr. Grove that the surface of the masonry at the depth down to nearly the surface of what is supposed to be the original rock was dressed in a coarser style than that above the present surface. Surely this is not consistent with the theory either of disintegration, or with that of the walls being intentionally carried down through such a stratum of *débris*. Another question suggests itself, from Mr. Grove's description, which increases the wonder we should feel at the constructors of these enormous walls under the theory which Professor Ansted has advanced. Mr. Grove states that Mr. Warren, in driving his exploring shafts through the *débris*, has met with great difficulty in getting through, and his frames have been crushed at even a moderate depth; and when we hear that the walls are supposed to have been carried down through 70 ft. depth of this *débris*, what astonishment we must feel at that process of construction being carried out under such difficulties.

Professor Ansted.—I do not want to keep up the discussion of a question purely geological, and although some things that I have said may appear theoretical, they really have a practical bearing. I wish to point out that in limestone districts, where the stone is exposed to the action of the weather, and where it is not sheltered by buildings or cultivation, the destruction of the rock at the surface is commenced by weathering and destroying the surface, but soon penetrates the *débris* and reaches down to a very great distance indeed. I may point out generally there are good proofs of similar action in other hard rock (not limestone) in the Channel Islands of Alderney, Guernsey, and Jersey. I have recorded in a book a section made for road purposes in one of these islands through granite rock, in which it was found that the solid granite had been decomposed and converted into a mixed mass of gravel and large round boulders. These boulders of granite are produced by the weathering or partial decomposition of the rock to a depth of about 70 ft. In limestone there are no such striking examples in the south of England; it is chiefly in the southern and eastern shores of the Mediterranean where the limestone is hard and brittle, and crowded with minute fissures, into which the rain and vegetation make their way, that the great results are produced. I remember instances in which an olive tree has burst asunder blocks of stone of large dimensions, lifting them completely out of their place; and I have seen a stone weighing not less than 15 or 16 tons thus moved by the roots. It is an undoubted fact that even in the case of perfectly dry angular gravel, without a particle of soil, vegetation can exist, and vines thrive and do well. With regard to the dressing or facing of the stones now buried in this mass of shingle, not having been on the spot I cannot speak with certainty. I can only suggest that the walls were probably constructed throughout in a manner not unusual in that part of the world. All the stones are fairly dressed, and are squared so accurately as to leave no crevices either above or below, or at the sides. Partly from habit, and partly from a sense of security, the walls, even where not seen, may have been thus constructed. This style of building was common in the East, where Cyclopean walls were as common as in Greece and Italy. Some parts of the walls are buried, but they are all probably constructed in the same way—carefully squared, the outer surfaces roughly dressed, and all the stones fitted very closely indeed. I imagine this must have been the style of wall built in this part of Jerusalem.

Mr. Walter Morrison, M.P.—I have had the good fortune to have been at Jerusalem, and to have lived for years in that district of our own country which is perhaps most like Judea in outward appearance, viz., the mountain limestone district of the West Riding. There we are familiar with these slopes of *débris*, locally called "screes," broken off by the action of frost, &c., wherever the limestone is exposed. And so at Jerusalem, as all who have been there will recollect, on the western slope of the Mount of Olives the limestone crops out in terraces like steps, and yet neither on that nor the similar eastern slope of the mountain do you find anything like the same accumulation of *débris* as on the slope from the Haram to the Kedron. Again, the soil on the Mount of Olives is of a red colour, that on the Haram slope among this shingle of a grey, limey appearance. I am myself inclined to think that the largest part of this *débris* consists of the ruins of Herod's Temple itself, as thrown down first by Titus, and afterwards by Hadrian. We must recollect that the buildings must have stood some 100 ft. higher than the present level of the Haram, and we know the columns alone were 60 ft. in height.

THE EARLY ITALIAN PAINTERS.*

NOT to have read Mrs. Jameson's biographies of the early Italian painters is to be at a stage of incompleteness in artistic lore that few persons should like to own in these days of diffusion of art-knowledge; for her work is one of the best groundworks for more particular information about the styles and the works of the different masters that we have. She has told the story of the lives of the painters rather than given a technical criticism of their works, yet she has entered sufficiently upon the topics of modes and mannerisms to enable the unaccustomed eye to detect leading characteristics. However, by the time a work has reached its tenth edition it is unlikely that any large portion of the reading public is unacquainted with its contents, either by hearsay or eye-proof. We need not, therefore, indicate the manner in which she executed her self-set and evidently much-enjoyed task. Most of our readers will be familiar with the generous and keen appreciation of beauties, the kindly judgment with which she greeted the works of the mighty dead; and, more than these, the earnestness with which she strove to refute any imputation of unworthiness that has attached itself to the memories of some few painters, where it was possible, consistently with truth, to do so. We feel, as we turn over her pages, that, if she could, she would have wiped every reproach away. Every anecdote that in any way hands down a blemish upon the reputation of a painter she looked upon with suspicion and did her best to confute. Does any one say that Il Francia died of envy because his fame was eclipsed by that of Raffaelle? Nothing, she avers, could have been said that was more inconsistent with the character of one who was both gentle and generous, and who for years cherished the warmest friendship for his supposed rival, and we may set the imputation aside as unworthy of belief. Raffaelle a freeliver! There was, she confesses, a vulgar idea prevalent at one time that he was a man of vicious habits, but this unfounded slander has been silenced for ever, and we may rest assured that no earthly renown was ever so unsullied by reproach. Perugino mean and avaricious! How could that be, when it is known that his greatest delight was to see his beautiful wife arrayed in the costliest garments, which he would sometimes drape upon her with his own hands? Parmigiano waste his money in gambling and dissipation! Well, well; he was sensitive, refined, amiable, and handsome. Gian Bellini meanly steal the secret of the manner in which Antonello de Messina mixed his colours! It is a consolation, she declares, to know that this story does not rest on any evidence worthy of credit. Then she gives Torregiano's mild version of the quarrel in which the nose of Michelangelo suffered so severely. And in this way, throughout the task, the friendly hand, that is now lost to us, plucked the sting out, if she could, wherever she saw it festering.

The present edition of this graceful work is enriched with fifty-eight portraits, though the original illustrations still referred to in the text are not given. The portraits are very instructive. If we may rely upon them as likenesses, they show us that the lofty fronts that we associate with intellectual gifts are, at all events, not the sole possessors of pictorial powers. The swiftly-receding forehead of Fra Giovanni de Fiesole, commonly called Il Beato Angelico, for instance, would make us pause before we could accredit him with the pure, saintly, seraph-like refinement shown in his works. Lorenzo Ghiberti, he who wrought those matchless gates which Michelangelo declared were worthy to be the gates of Paradise, possessed a brain that was also encased behind a swiftly-receding forehead. If it be a question whether the compression of the events of a life into a few pages should be regarded as an honour or a mortification, the same diversity of opinion must exist as to the value of portraits, for if they are faithful in some particulars it is seldom that they are so in all, and we are, therefore, not warranted in forming conclusions upon the data they afford. Nevertheless, to be able to hold fifty-eight portraits of people who have attained celebrity in the same art in the hand, and compare their characteristics, is not without some gain.

Without dogmatically asserting the fact, we can see that Mrs. Jameson held that the best men were the best artists: the purer their lives the more glorious their colours, the more lovely their forms. There was a time in the present century when clever men were generally believed to be profligates, faithless husbands, and bad fathers; and some of this time our authoress must have seen. There is the more credit to her discrimination, therefore, in seizing upon the reverse of this belief as a base for her judgment.

If Michelangelo, like Cimabue, was haughty, disdainful, and imperious, he was also a faithful friend and good master, as the tenderness with which he nursed his old servant when on his death-bed bears witness. If Titian lived in somewhat luxurious state in Venice, and made the unprincipled wit Pietro Aretino his intimate companion, he was economical till he could afford to make a display, and indefatigably industrious up to his ninetieth year, when early morning and evening hour still both found him at his easel, with his son Orazio by his side, sometimes working on the same canvas. If Andrea del Sarto broke his promise to Francis I., and appropriated to his own use sums entrusted to him to be expended on specified objects, these acts were owing to the unfortunate influence of a bad wife, and were foreign to his own inclinations, and bitterly repented. But the instances that require a review of a whole life, or a taking of all in all, to find traits shown at one period to redeem blemishes seen at others, are few; the greatest number of those we are accustomed to call masters spent industrious, blameless, domestic, or religious lives. Giotto left four sons and four daughters, proving that the cares of a large family did not prevent his hand becoming the great interpreter of all the beauty, poetry, and love to be found in the human soul, nor his mind from impressing his art with more personal influence than has ever been exercised by any one man before or since. Mrs. Jameson says, "Giotto's personal character and disposition had no small part in the revolution he effected. In the union of endowments which seldom meet together in the same individual, extraordinary inventive and poetical genius, with sound, practical, energetic sense, and untiring activity and energy, Giotto resembled Rubens. . . . No visitor to Florence ever looks up to the Campanile without a feeling of wonder and delight, without thinking what that man must have been who conceived and executed a work so nobly,—so supremely elegant; while to the philosophic observer Giotto appears as one of those few Heaven-endowed beings, whose development springs from a source within." Fra Angelico was another blameless being, though of a different order, living out of the world instead of in it,

* Memoirs of Early Italian Painters, and of the Progress of Painting in Italy. Cimabue and Bassano. By Mrs. Jameson. London: John Murray, Albemarle-street. 1868.

for at the age of twenty he entered a convent, and, except once, for a brief visit to Rome by command of the Pontiff, he never left it till his death. His fervent devotion found utterance in his pencil, and his days were industriously passed in the production of works each of which may be regarded as a superb hymn of praise, conforming in all things to the rule of his order. He received commissions through his superior only, and the proceeds became the property of the convent. It was "the passionate energy" that Masaccio threw into the study of art, and the contempt of all common pleasures and frivolous pursuits that he exhibited, that first drew the notice of Cosmo de' Medici. Benozzo, the favourite pupil of Fra Angelico, was also an excellent man, pious, and a good Christian. Signorelli, we are told, was "a man of great learning and industry, as well as original genius; of irreproachable life and amiable manners; courteous and helpful to those who needed his assistance; to his numerous scholars kind and communicative, as became a great and generous artist." Domenico Corradi, says Vasari, was the delight of the age in which he lived. Mantegna, one of the hundred and thirty-seven pupils of Squarcione, was another honourable man, and it seems a fitting crown to his just life that he was able to return to Mantua, after he had been employed at Rome, and build himself a magnificent house, which, with his own hand, he embellished with paintings, both on the exterior and in the interior, and in which he ended his praiseworthy days. Il Francia was a man of exemplary morals, amiability, and cheerfulness—so witty, so wise, so agreeable, depones Vasari, that "the saddest man" would have felt happy in his company; and his family, fellow-citizens, strangers, and princes loved and venerated him. Fra Bartolomeo was enthusiastic, devout, and affectionate: accordingly Mrs. Jameson sees the greatest tenderness and softest regular beauty in his female heads, and a sweet, mild dignity in his saints; for just such qualities as an artist possesses can he depict. Leonardo da Vinci was "*the* miracle" of the age of miracles in which he lived. "Ardent and versatile as youth; patient and persevering as age; a most profound and original thinker; the greatest mathematician and most ingenious mechanic of his time; architect, chemist, engineer, musician, poet, painter," — no wonder that in our day Hallam has looked upon his acquirements as revelations calculated "to strike us with something like the awe of preternatural knowledge." Not only men, but "the very brutes," we are told, loved Raffaelle. Giulio Romano, too, was a man of generous moods. Tintoretto must have had lovable qualities, for his daughter, whose pictures had won her so much celebrity, that both the Kings of France and Spain invited her to their courts with tempting promises, would never leave him. Paul Veronese lived an amiable, liberal, generous, pious, domestic life, asking but very small prices for his pictures when he painted for churches or convents, and educating his sons and other relatives in his atelier. And of Bassano, whose pictures are compared to handfuls of rubies and emeralds, it is written, "nothing could tempt him from the little native town where he flourished, grew rich and brought up a numerous family." In fine, all these gifted men were good; it is impossible not to deduct the inference from the evidence placed so lucidly before us that the purer our lives the better our work will be: the hand and brain cannot set forth virtue or truth in glowing colours if the heart be clouded with vice.

The unwary are warned by our authoress that they must not accept as genuine all the paintings referred to the various masters. In some instances two painters have wrought on the same canvas, and it is now impossible to identify their respective styles. We have just cited the case of Titian and his son. The pupil's work is often scarcely distinguishable from that of the master. The brothers Dossi, who unfortunately by no means agreed in their lifetime, are now inextricably merged in one, all writers finding it scarcely possible to distinguish their works. Not one-third of the pictures attributed to Leonardo da Vinci were the production of his own hand, though it is allowed they may have been executed under his direction and from his cartoons. Of the paintings ascribed to Giorgione especially, few are genuine. The greater number of them were painted by the Venetian, Pietro della Vecchia, a clever imitator of his mode of execution, style of colour, and everything but the feeling that Giorgione threw into his work. Titian's picture of the "Four Ages" is, however, the only one that should have imposed upon skilled judges. This, painted when he was in daily communion with him, doubtless reflects much that he gained from his companionship. With suchlike dexterity does the biographer teach her readers to look below the surface for the full meaning of things. In every respect we consider she accomplished the aim she set before herself, which was to suggest to young students of art comparative and discriminating reflections.

MONUMENTAL.

Statue of Lord Palmerston.—At a recent meeting of the town council of Southampton the mayor announced that he had received a letter from the sculptor of the statue to be erected in the town to the memory of Lord Palmerston, to the effect that it was now on view in the Royal Academy, and would be ready for erection in July. It would be necessary for the council to provide a site for its erection, and to prepare the foundations and erect the pedestal and sub-plinth for it. The statue, they would remember, was raised by public subscription, but all the money had not been promised, and if they were not prepared with a site for its erection it would probably be a long time before they came into possession of it. Some part of what he had asked for would have to be provided by the subscribers, but the foundation certainly would not, and, as the corporation had the power under the Marsh and Markets Act to erect statuary and to place other ornaments in the parks, he recommended that the Marsh and Markets Committee be empowered to do the work he had asked, and added that it would be gratifying to reflect that Mr. Sharp, the sculptor, was closely connected with one of the leading families in the town, and that no doubt the work would possess much interest as well as be an ornament to the town. A resolution in accordance with the mayor's suggestion was agreed to; the cost of the foundation, pedestal, and sub-plinth not to exceed 80*l*.

Memorial of the late Earl of Carlisle.—The Carlisle Memorial Chapel, attached to the Castle Howard Reformatory, has been publicly opened for service. The chapel is intended as a place for divine worship during bad weather and the winter months for the inmates of the Reformatory, and is also intended to serve as a schoolroom. The building has been paid for by subscription of those friends and admirers of the late Earl of Carlisle who, while subscribing to the county memorial, now in course of erection, dissented from the view that a purely ornamental erection should be adopted. The building was designed by Mr. J. L. Pearson, of London, and combines the ecclesiastical with the domestic in style.

THE WESTERN PENNSYLVANIA HOSPITAL.

THE great State hospital of Western Pennsylvania at Dixmont is now far advanced towards completion. The central buildings were completed in 1861. The western wing has since been erected; and now the eastern is in progress. In the last report of the architect, Mr. J. W. Kerr, to the Board of Managers, he gives an account of the whole building, from which we glean the following particulars:—

The main buildings of the hospital will consist—when the eastern extension, now commenced, is completed—of a central building of 61 ft. front by 131 ft. deep, having on each side of it a wing of 345 ft. front by a minimum depth of 38 ft., making the whole 751 ft. front, the central part and portions of the wings being four, and the remainder three stories in height. These buildings being arranged in a cluster of connected parts for the purpose of facilitating ventilation, would, if all were placed end to end in a straight line, make a front of 1,150 ft., or about one-fourth of a mile.

The first, second, and third stories are each 12 ft. high in the clear, and the fourth stories 15 ft. high.

The central building contains a chapel 50 ft. by 57 ft. on the floor, and 27 ft. high in the story; three stairways, corridors, or halls, 17 ft. wide; and the offices, parlours, and chambers of the medical superintendent and his assistants; one kitchen, 19 ft. by 27 ft., and another of 17 ft. by 19 ft.; and pantries, closets, and bath-rooms.

The wings contain 250 private rooms for patients, the smallest room being 8 ft. by 10 ft.; twelve dining-rooms, eight parlours or day-rooms, twelve bath-rooms, and other closets; store and drying rooms; having halls or corridors 12 ft. wide running through the middle of each wing.

The buildings are lighted with gas made in a detached building, and are warmed throughout by steam from radiators placed in the cellar story, the warmed air being carried to each room and the corridors, through tin-lined flues in the partition walls, and the vitiated air being carried off by other flues leading to the attic, where they connect with ventilators on the roof.

All parts of the buildings are supplied with hot and cold water, conveyed in galvanised iron pipe, and all waste is carried off through ventilated drains of cast-iron pipe.

In the erection of the buildings, including laundry and various other outbuildings, there have been used 8,300 perches of stone, 4,000,000 bricks, 46,000 ft. of roofing, and 52,000 yards of plastering, over ten acres, and the gas, water, and steam pipe used amounts to over nine miles in length. The floor surface of the hospital buildings amounts to three acres in extent.

The whole work has been designed more for utility than show.

ART AND ARCHITECTURE IN ABYSSINIA.

IN a recent number of the *Builder* (p. 257) allusion was made to Abyssinian notions of fine art, as they have been described to us by English newspaper correspondents. Some of the letters from the land of the late King Theodore are full of the most curious and interesting information regarding the works of Abyssinian artists, and they also give us an idea of the capabilities of—we suppose we may be allowed to call him so—the ecclesiastical architect of Abyssinia. The efforts of both, as might be expected, are of a very rude and crude kind, showing an extremely primitive condition of art. It may, however, be presumed that these native works are an advance on the efforts of many kindred barbarian tribes. One of the camping places of the English expedition was at a place named Antalo or Booyeah. Among Abyssinian towns this is one of the most considerable and important. What may be the number of its inhabitants we are not, however, told. By the way, it would be a rather difficult thing, one would imagine, for a *white registrar* to take the census of a large black population, and to be certain that he had taken it correctly! It could only be effected, we presume, on the instinctive knowledge principle by which shepherds, it is said, are enabled to recognise each individual sheep, not only by its presence, but by its absence from the fold. Antalo, we are told, has at first sight a picturesque effect, being built of red sandstone, which the trees surrounding its three churches relieve. One of these churches is the cathedral which is dedicated to St. George. It stands by the river side, embossed in a grove of lofty cypress-trees. The cathedral is a circular building one story high, and roofed with thatch. It is built in three concentric circles. The innermost, or most central, is the most holy place where the ark is kept, where priests alone may enter. The second is ornamented with rude frescoes, which cover the whole of the wall space. A large number of wooden doors, and windows having wooden shutters, gives communication between the outer and inner passages.* There are upwards of a hundred pictures; and, as the church is dedicated to St. George, his triumphs have, of course, great prominence in the subjects chosen. Other designs represent the Madonna and Child, the Crucifixion, the Stoning of St. Peter, our Lord walking and St. Peter half-sinking in the sea, with other incidents of New Testament history. Those pictures which it would seem are held in the greatest reverence are the Virgin Mary, which is life-size and encased in metal in Russian style, and a large fresco of St. George on a white horse, killing the dragon. There are also

* These peculiar arrangements of the Abyssinian highlanders are in singular accordance with explanatory suggestions as to the concentric circles and central cups of the rock symbols of the high lands of England, Scotland, and other countries, treated of in a series of articles in the *Builder* some years since.

life-size portraits of the Archangels Michael and Raphael. None of the paintings, according to one correspondent, are executed with the slightest regard to perspective, and all seem to be but rude imitations of the religious paintings of the Early Mediæval period. This opinion is borne out by the *fac-simile* of two pages of an Abyssinian Bible published the other week in the *Illustrated London News*. One page represents the Creation of Adam and Eve, and the Crucifixion in another compartment. The other exhibits the figures of St. Theodore and of St. George and the Dragon. Nothing could be more grotesque than these pictures. They resemble the crude pencillings with which an English urchin of about four years of age is in the habit of decorating his slate. This Bible has been forwarded, along with other curiosities, to the British Museum by the representatives of that institution sent out to Abyssinia on a collecting mission.

FROM SCOTLAND.

Fountainbridge (*Edinburgh*).—At a recent meeting of the Chalmers Working Men's Hall and Institute, Fountainbridge, it was stated that a property had been acquired in Ponton-street as a site for the institute, and, after paying all expenses, there remained a sum of 366*l.* 9s. 3d. towards the building fund. Mr. Patrick Wilson had examined the site, and had prepared a plan, which the trustees recommended for adoption. The cost would be about 1,000*l.*, and the trustees hoped to raise at least as much money as they had in hand, and they knew where the remainder could be had on loan. It was thought there should be no difficulty in raising that sum. Mr. Wilson submitted the plans he has prepared. The institute is to be a plain building of two stories, with a frontage to Ponton-street. On the ground-floor are two large rooms, 27 ft. by 16 ft., which it is proposed to fit up for games, and also as reading-rooms. On the second floor there is a hall, 57 ft. by 38 ft. It is intended to erect a gallery in one end of the hall, which will then be capable of seating 330 people. Committee-rooms, or rooms where silent games could be carried on, are also provided on this floor. The plan has been prepared with the view of leaving room for further erections, without interfering with the original building. Resolutions approving of the plans for the institute, of the constitution of the association, and of the trustees appointed were thereafter put to the meeting and carried.

THE OTTOMAN RAILWAYS.

LAMARTINE, in his work on the East, says,—"Let us congratulate ourselves on having found a living people among a people supposed to be dead."

When H.H. Abdul Aziz was invited by the Emperor of the French to the World's Fair, one who, by a happy presage, exhibited his marvellous works at the Champ de Mars, we could foresee the birth of a movement of progress.

Carried away in the whirlwinds of Western civilisation, which annihilate distance, quitting his vast empire, which the difficulty of communication separates from the family of European nations, the first thought of the Sultan was necessarily directed to the miracles of modern ingenuity. Also, he could compare and judge of the degree of advancement of Western nations, the prosperity of which is in a great part due to the magnificent lines of communication established in all directions. Thus, no sooner had the Sultan returned to his states than, convinced of the utility of this means of transport, he conceded to strangers the right, not inscribed in the Koran, to possess landed property in the Ottoman empire, and he granted thus many important concessions.

In fact, by a happy coincidence, for two years already, serious negotiations have been opened with the Divan by four Frenchmen, MM. E. G. Pist, Toucas at Constantinople, the Count Paul de Saint-Allais, Paris, and J. B. Sauron, French vice-consul at Odessa, for the purpose of obtaining the concession of the Ottoman group of railways for large contractors of Brussels, to whom they were formally engaged.

On the departure of the Sultan nothing had been decided, but the line was marked out: as soon as he returned, M. Toucas obtained, on the 1st of October, 1867, the ratification of the bases of the treaty, and, on the 31st of March, 1868, the firm of C. & L. Van der Elst, Brothers, & Cie., represented by M. Cyrin Van der Elst, received from the Sultan the firman of the concessions of the following lines of the Ottoman group, going from—

Constantinople to Adrianople,
Adrianople to Tatar-Bazardjik,
Tatar-Bazardjik to the frontier,
Salonica to Uskiup,
Uskiup to Nisch, and
Enos to Adrianople.

THE NUISANCE AT TATTERSALL'S.

STEPS ought to be taken at once, and before it be too late, to mitigate the nuisance and inconvenience caused by the proceedings at Tattersall's in Knightsbridge, chiefly on Mondays. The roadway, there very narrow, is obstructed by the standing of vehicles, and round about the gateways a vast crowd of blacklegs and their victims gather and remain. For a time after the passing of a recent Act the police prevented this to a considerable extent, but matters now go on just as badly as before. On Monday last, in the afternoon, there were from 300 to 400 persons of the disreputable classes alluded to congregated near the entrances. The parish authorities ought to move at once, and nip this monstrous and demoralising nuisance in the bud.

WATER SUPPLY AND FEVER AT BALSALL HEATH, BIRMINGHAM.

AT a recent meeting of the Balsall-heath Local Board some very interesting facts were disclosed by Mr. Scofield as to water supply. This gentleman stated, says the *Birmingham Journal*, that, having procured water from various wells in the district which had been affected by disease, he found that the supply which came from wells serving houses in which fever had raged most severely contained the largest admixture of organic matter, while water from the opposite side of the street, where fever had not prevailed, contained the least proportion of organic pollution. He further stated that the wells from which the greatest amount of organic matter had been derived were more or less surrounded by pigsties, ashpits, or privies. The inference seems perfectly clear: surface-drainage has polluted the wells, and polluted wells have given origin to fever. Such being the case, it is very satisfactory to learn that a remedy is being applied. A firm of manufacturers having endeavoured to sink a well in the district, found the attempt frustrated by the falling in of earth. To avoid this difficulty, they determined to make trial of the American tube pump. This has completely answered their purpose, being found to throw up 300 gallons of water per hour. Some others of these tube pumps have since been fixed, at various depths, from 10 ft. to 17 ft., and in almost all cases good water has been obtained. Here, then, is a way out of one part of the trouble. By the use of tube pumps, instead of wells, the freedom of water from surface consumption may be secured, and that alone is a considerable step towards the eradication of the fever.

DURSLEY CHURCH, GLOUCESTERSHIRE.

THIS fine church was re-opened on the 16th ult., after restoration. It was formerly in a very dilapidated and unsafe condition: the outer walls and the great nave arcades were very much out of the perpendicular, in some places leaning as much as 14 in. The foundations were from the first constructed without footings, and of no great depth; and they had in recent times been undermined by vaults and graves in a way which would have endangered the stability of a far stronger fabric; and the piers and columns had been cut away and hollowed out in many places for the purpose of fixing monuments, and that in a manner seriously to weaken them. Huge galleries encumbered the western end of the nave and aisles, and the floor was covered with high square pews of deal panelling. The chancel was a modern building, small, and of no architectural character. The roofs of the north and south aisles were of chestnut, and very handsome, and dated from the fifteenth century.

The work just completed consists in the restoration of the body of the church to a sound condition, in the enlargement of the church by a new chancel, vestry, and organ-chamber, and in adding of a clearstory to the nave. In order to bring the fabric into a safe and satisfactory state, it was considered necessary to take down and rebuild both the nave, arcades, and the north aisle. Care has, however, been taken to retain everything of architectural or antiquarian interest that was possible, and so to make the work bear the character rather of restoration than of renovation.

The foundations have been carried down to the solid rock in nearly every case, and in some places have gone nearly 12 ft. deep. The concrete on which the piers are built is in no instance less than 6 ft. thick. The walls of this part of the church are faced with Puff stone, a sort of stalactite found at Duraley, which has a very picturesque effect. The new buildings are of Knackery stone, with dressings of Bath stone. The vestry is on the south side of the chancel, with an organ-chamber above, opening into the chancel with a wide arch. The old organ is for the present retained, but it is hoped soon to replace it by a larger instrument. The old roofs of the aisles have been restored, and the nave roof has been completed to a similar design internally, but raised to a higher pitch externally. The new clearstory consists of eight three-light windows on each side. The windows, new and old, have been glazed with quarry-lights in lead, re-arranged in geometrical patterns in the heads and tracery. The chancel has been paved with a mixture of plain and encaustic tiles and marble.

The cost of the whole work has been rather more than 5,000*l.*

Something still remains to be done in the way of substantial repair. The fine groined porch and the south-west angle of the church are in a state which requires serious attention. The carving, tiled floors in nave and aisles, stained glass in east window, &c., also remain for the present incomplete for want of funds.

The architect of the whole work is Mr. T. G. Jackson, M.A., London. Mr. R. Futcher was the contractor for the fabric, Messrs. Whitfield & Sons executed the seats in the body of the church, Messrs. Farmer & Brindley the chancel seats, and Mr. W. Godwin the chancel pavements, the marble being supplied by Messrs. Farmer & Brindley.

THE DESIGNS FOR THE NATIONAL GALLERY AND LAW COURTS.

IN the House of Lords, on Tuesday last, in reply to Viscount Hardinge, who asked what steps the Government proposed to take with respect to the preparation of designs and plans for the New National Gallery,—

The Earl of Malmesbury said, on receiving the report of the committee of which the noble viscount was himself the chairman, if he recollected rightly, the Government communicated with the trustees of the National Gallery, and from the trustees, who also furnished a report, the Government received a succinct set of suggestions, giving a complete account of the space required, and giving also some very valuable suggestions. The Government was now waiting in consequence of that report. His noble friend the First Commissioner of Works had not yet decided who the architect should be. The plans were ready to be submitted to the architect as soon as he was selected, but the report sent to the Government by the committee gave rise to the impression that none of the plans suggested were such as ought to be adopted.

The Duke of Rutland hoped that in a short time an architect would be found who would be able to design a satisfactory plan for the new building for the national collection of pictures.

On the same day, in reply to Lord Denman,

The Lord Chancellor said as to the Law Courts,—A competition was invited, which was responded to by a certain number of architects—eight or nine—who sent in plans, which were publicly exhibited. Before they were sent in a memorandum was drawn up of the terms on which the exhibition was to be held, and it was, that referees should be appointed by the Treasury, who were to determine to which of the plans exhibited the award of superior execution ought to be given. The referees who were charged with this duty were unable to agree that any one of the plans exhibited in competition was the best, but

they selected two, and made an award that they thought the interior plan of one of the competitors and the exterior plan of another were the best. That award having been made, some of the unsuccessful competitors objected to it as being beyond the power of the referees. They said, "We entered into competition each one against every other, but not into competition with the joint production of two others." In the memorandum of the terms of competition it was stated that any matter in dispute should be referred to the decision of the Attorney-General. That has been done, and I believe the reference is still going on, and until it is concluded it will not be in the power of the commissioners for the erection of the Palace of Justice to take any steps in regard to the selection of any plan. I hope that before long the reference will be terminated, and that the commissioners will then be allowed to proceed with the erection of the building.

"THE ART SEASON."

AT a meeting of the Society for the Encouragement of the Fine Arts, on Thursday evening, the 8th inst., Mr. H. Ottley delivered a discourse "On the Art Season." The speaker took a rapid survey of the art-history of the year, including points of interest connected with public works, and the products of art as displayed at the exhibitions of the season, and in the printsellers' windows. Speaking of the 100th exhibition of the Royal Academy, now opened, Mr. Ottley said that, whether considered as a whole or in its parts, it did not warrant the title of being "fully up to the average of former years." On the contrary, he considered that it was a bad exhibition, beyond any precedent within his memory, and one discreditable to the arts of the country. He did not think there was a picture in the whole range of it which the country would be prepared to put forward, whether at home or abroad, as fairly representing the status of our art. This was a sad reflection; and on this 100th anniversary of the foundation of the Academy the question thrust itself upon the mind how far that institution would have to be held responsible for the result as it stood before them. The votaries of art amongst the community had increased a thousandfold in number and intensity of appreciative feeling during this eventful century. The artists as a body had also greatly increased in point of numbers during the same period; but had the number of artists of first-rate merit increased amongst us in anything like the same proportion? He thought not. Certainly there were not three artists amongst us at the present day to compare with Reynolds, Gainsborough, and Hogarth—a grand triumvirate of the last century—neither of whom owed anything to academic instruction.

CONNEMARA MARBLE.

TWO or three years ago I was applied to, on the part of the Baron de Triqueti, through Mr. Trenham Reeks, for blocks of the above substance, to complete the ornamentation of the Royal Family Memorial in Wolsey's Chapel at Windsor. We had not then entered on the examination of the district containing the stone known as Connemara marble; and, after vain endeavours to induce any of the Dublin stonemasons who had it to part with any of it, I was obliged to cause two large blocks that I heard of as lying in a mason's yard in Galway to be transmitted to Paris, in order that Baron de Triqueti should have the pieces that suited his purpose cut out from them. The old quarry at Ballyhinch being then closed, I was informed that no other quarry was open, but that blocks were got from masses scattered over the surface where the rock lay in the ground.

A year or two ago, when making a preliminary examination of the ground near Westport, Mr. G. H. Kinahan (senior geologist of this Survey) showed me a cutting through this rock in the railroad a mile and a half to the south-east of the town. I subsequently crossed a broad band of it running along the rocky hills to the south of the town; and have just examined, with Mr. R. G. Symes, who is now geologically surveying the district, the northern slope of Croagh Patrick, on which we find two, if not three, broad bands of the stone. It strikes steadily from east-north-east to west-south-west for about six miles, dipping northerly at a high angle, the widest band being about 300 ft. in width.

In places the stones appear to be beautifully mottled with various shades of green, and occasionally with reddish tints. Large crags occur in it, which are much jointed near the surface, and part of the rock seems very brittle and splintery. It would, however, doubtless be more massive and solid "in depth."

The bands on the northen slope of Croagh Patrick, just south of Murrisk Abbey, are hardly two miles from Westport Bay, with a gentle slope for a tramway the whole distance, and about six miles from the railway station at Westport, to which there is a good road.

Should there be a demand in the architectural world for this ornamental stone sufficient to make it worth any one's while to open a quarry in it, I could hardly conceive a more convenient place for it than that now mentioned; and I therefore, with the sanction of Sir R. I. Murchison, the Director-General of the Survey, beg leave to make its existence known through your columns, should you think the announcement worthy of a place in them. J. BEETE JUKES.

H. M. Geological Survey, Ireland.

P.S.—I have since heard that the old quarry has been re-opened within the last twelve months.

THE ALBERT MEMORIAL MUSEUM, EXETER.

WITH reference to a paragraph noting the opening of the Albert Memorial Museum in Exeter, that appeared in our impression of the 2nd inst., Mr. John Hayward writes,—

"Three-fifths only of the whole design are at present completed, at a cost of about 6,500*l.*, exclusive of the site. A further sum of 3,000*l.* is needed for the erection of the south wing, to complete the design; and it was in aid of the building fund that the recent fancy fair and other festivities have taken place, as well as to celebrate the opening of the building. The result of the enterprise is very satisfactory, inasmuch as 2,700*l.* have been raised, clear of expenses, sufficient, not merely to pay off a heavy debt on the portion of the work at present completed, but also to furnish a handsome sum towards the expense of building the remainder. The design of the building has been considerably altered from that which appeared in your columns, the principal difference being the omission of the central tower, much to the detriment of the building, owing to the strict enforcement of a stipulation imposed on the committee by the gentleman who gave part of the site, that the height should not exceed a certain limit. The plans are substantially the same."

THE ARCHITECTURAL MUSEUM.

ACCORDING to the report laid before the members, nine tenders were sent, in reply to the invitations for building tenders, for the new Museum at Westminster, and the lowest (for 2,970*l.*, by Mr. R. E. Roberts) was accepted. The works have so far progressed that the building will be shortly roofed in. The building fund at the disposal of the council now amounts to about 2,000*l.* A further sum of 1,000*l.*, in addition to the many kind gifts of material, &c., hereafter enumerated, will be wanted to defray the cost of the building alone, exclusive of the legal charges for the lease, and of the many incidental expenses unavoidably incurred from the time of clearing the site to that of the removal of the collection to its new home.

The council therefore appeal with renewed earnestness to all former friends of the Museum, and to all who care for its objects, whether or not previously subscribers, for their kind and prompt co-operation in raising at least a portion of the 1,000*l.* still needed.

The following offers of materials, &c., have been made:—

"Messrs. Clark & Co. have undertaken to fit up the two ground-floor front windows with their patent steel revolving shutters, and Messrs. Bunnett & Co., 'in acknowledgment of their employment by most of the chief members of the architectural profession during the last thirty years,' volunteered similarly valuable assistance on their hearing of the proposed removal of the collection. The six iron principals for the roof are a gift from Messrs. Kelk & Lucas; Messrs. Burt & Potts promise iron casements for some of the windows; Messrs. Foucard contribute the Caen stone required for the interior of the building; Messrs. Rust & Co. offer glass and mosaic material; Mr. Godwin, of Lugwardine, in addition to 20*l.*, will make some ornamental tiles, specially designed for the front of the building; Mr. Fabbricotti promises carved Carrara marble of the value of 50*l.*; Messrs. Strode & Co. add to a donation of ten guineas a present of one of their patent gas sun-burners, fixed free of charge; Mr. Charles Hudson undertakes some coloured decoration; Mr. Robert Chapman (art-workman) is willing to make a piece of furniture; Mr. E. Whitehead (art-workman) offers to execute some carving; and Mr. N. Thwaites has contributed a model of the Museum front."

On the completion of the building, the valuable collection of about 200 Classical and Mediæval casts, formerly exhibited at the Royal Institute of British Architects, and now transferred to the care of the council of the Architectural Museum, will be displayed.

CHELTENHAM DRAINAGE.

MANY of the landowners and occupiers who live below the town of Cheltenham have for some time past felt themselves aggrieved, in consequence of the continued flow of the sewage into the river Chelt and Hatherley Brook, which, they allege, so fouls the streams as to create an intolerable nuisance, injurious to property, dangerous to the health of the inhabitants, and hurtful to the cattle pastured in the vicinity. A meeting of the adjacent landowners and occupiers has recently been held, when it was resolved "to take such measures as will compel the Local Board of Health of the borough of Cheltenham to abate the nuisance forthwith." The following resolution was afterwards unanimously adopted by the meeting:—"That should the Local Board determine to abate the nuisance by an irrigation scheme, we, the undersigned, are willing to take the flow of sewage over the number of acres attached to our names, for such time, and on the payment of such reasonable sums to the Local Board as may be agreed upon." (Here follow the names of twenty-nine owners and occupiers of some 2,000 acres of land, all of whom are willing to take the sewage on their land.) Mr. Bateman, C.E., has advised them to discontinue the present treatment of the sewage by deodorisation, in favour of the system of irrigation. The cost of the deodorising agents is some 800*l.* or 1,000*l.* per annum, and yet the plan is said to be so ineffectual that the authorities are in constant dread of being dragged into Chancery at the suit of adjoining landowners.

ART-MASTERS' REPORTS ON THE PARIS EXHIBITION.

SIR,—Some twelvemonth ago the Science and Art Department offered to the masters of schools of art a contribution towards the expenses of their visit to the Paris Exhibition, a further sum if they wrote reports on it if they were published, and three prizes for the three best reports so written. I read in several art and other periodicals some suggestive remarks from art-masters, and have been looking ever since for an award of these prizes. Never seeing anything as to the award either for art or science, I have spoken to a friend of mine who wrote a report upon the Exhibition, and his explanation is rather extraordinary. He says that very valuable reports both for the art and science divisions were written by science and art teachers, and published in the local and other papers, and formally sent in in 1867 for competition. Since then nothing has been heard of them. There were something under twenty reports in each division, and a fair judge could have awarded the prizes in a week, and, as far as reading goes, could have read them in a day, for almost all were short and terse. He says that part of the sum guaranteed towards expenses has been withheld, and that, for anything that can be known, the contract has been broken. Upon inquiring why he did not write to know for certain about this, my friend replied that, since the Parliamentary Commission on Schools of Art, when the authorities were compelled to keep the votes for the Museum at Kensington and the schools distinct, they have lost no opportunity of snubbing the art-masters who caused that commission to be held, and in so doing have produced rather an odd complication. One regulation they started was that art-masters should not be allowed to write to the authorities, or, if they did write, no notice should be taken of any communication they might desire to make; so that my friend re-

marked, "We receive letters from Kensington, and other communications, but can write none to it; we have information in abundance about immaterial matters, but have no means of getting the slightest information on vital points; and if I asked the entity called 'my Lords' why it had failed in its contract to me about these Paris Exhibition reports, the entity would act upon the regulation in the directory, and take no notice of my inquiry; for art-masters have some little spirit left, even after the nation has repudiated all its obligations to them, and will not send letters through the secretaries of their schools, suppressing their own names, which dignified hide-and-seek complication is what the state most recently approves of." I confess to being amused at this perfect development of red tape, and suggested that a letter should be written by my friend to the *Builder*, asking through its pages for some information. "Yes," he answered; "that is the only resource left; but I cannot afford to draw down upon myself a personal grudge. Like the historical eels, though we don't like it, we are getting used to being skinned alive, and have been made dumb beforehand, to smother our cries of complaint."

"Well," I replied, "we live in a free country, and I am at least unconnected with the authorities, and what you say shall be made known to solvent England, who shall be asked by me whether any department of its Government is insolvent to the extent of twenty shillings in the pound." AN AMUSED OUTSIDER.

Berwick-upon-Tweed.

*** We have reason to believe that the payments are in course of being made.—ED.

REBUILDING OF HER MAJESTY'S THEATRE.

THE following is a list of the tenders, just now received, for rebuilding Her Majesty's Theatre, in the Haymarket. The "quantities" were furnished:—

Smith & Taylor	£35,674	0	0
Cubitt	35,318	0	0
Myers	31,586	0	0
I'Anson	29,980	0	0
Piper & Wheeler	29,500	0	0
Holland & Hannen	28,439	0	0
Trollope	27,767	0	0
Foster	26,770	0	0

The above do not include the stage, machinery, fittings, fixtures, gas-fittings, fire-mains, warming, and decorations; but they include all iron-work.

SUGGESTIONS ON THE SUBJECT OF EDUCATION.

SIR,—The question of technical education, in my mind, greatly resolves itself into mechanical education.

Inasmuch as Britain's greatest wealth exists in her manufactures, principally constructed of the produce of foreign countries and her colonies, and when we find that foreign countries are making such rapid strides in the march of arts, commerce, and manufactures, it therefore becomes Britain to take immediate action in the education of the mechanical population of the British Isles.

When I look at the wondrous mechanical structures of the First Great Mechanic, especially the construction of the human body, where is there a machine constructed by human ingenuity of such splendid action and durability, although the materials are of so delicate a composition? If the human body had been constructed as the most delicate piece of machinery ever erected by man, how ungraceful would have been the demeanour! But we can extend or contract the muscles, and move many of the joints in various positions, at will. Seeing at a glance the great superiority of the movements of the human body over anything designed by man, what must be the mechanism of the soul, which is infinitely of greater value than the body? I think that ought to be the first and grand centre of attraction in mechanical education.

As it is necessary to adapt the routine of mechanical education to the existing laws of the country,—as they cannot be set aside nor declared null and void without an Act of Parliament, which cannot be passed without a period of time elapsing,—so we ought to make the best use of those means that are within our reach that will prove effective agencies when adopted, whatever code of law exists.

The only agencies which, I think, can be of efficacy are silent ones: let them speak for themselves. On entering the class-rooms of our seminaries, and taking a glance at the walls, we find that they are either bare or have a geographical map hanging upon them, which is very appropriate for imparting a knowledge of the earth's surface. Next, the cabinet containing fossil remains, different stratums of the earth, &c., very useful for instruction in geology. But as the sons of Britain cannot all be geologists or geographers, nor is it there that the wealth of the British Isles exists, but in her mechanical productions,—as maps are beneficial for instruction in geography, specimens of fossils and dendritic markings for imparting a knowledge of geology,—it therefore follows that drawings and models of mechanical structures exhibited on the walls and convenient spaces would be of great utility for imparting mechanical education.

These might be obtained by application to many of our copyists of Scripture paintings. Many artists, professional and amateur, would gladly hail the opportunity of displaying their productions by donations to the cause. Next, to obtain drawings and models of mechanical structures by application to engineers, architects, draughtsmen, artisans, and schools of art. I think from these sources there would be obtained by donations more designs than would be requisite for the use of seminaries, &c., for the mechanical population of Great Britain and Ireland. These representations should not be exposed to view at all times, as they would become wearisome to the eye of the student; by simple mechanical arrangement they might be exposed or concealed from view at the controller's pleasure, who should be a man of discernment.

ALEX. KAY, Working Man.

VISIT TO THE NEW SMITHFIELD MARKETS.

SIR,—My attention has been called by Mr. Horace Jones to a letter which appears in the *Builder* of last week, signed "Stylus." I much regret that the Association, but more particularly the honorary secretaries, should have been the innocent cause of depriving one of the members of an anticipated pleasure; but I am quite unable to reconcile the statements made by "Stylus" with the facts of the case.

Permit me to say that every arrangement was made to direct members to the place of meeting (viz., the model-shop, at the end of the masons' yard), where we remained until twenty minutes past three, Mr. Jones in the meanwhile explaining the general plan and design of the building. From this, as our starting point, we perambulated the building internally, and to a great extent externally.

In reply to the queries given, the President and about thirty-five members found out the place of meeting, and, under the conduct of the City Architect, inspected every part of the buildings, accompanied by the clerk of the works. I am not surprised that in a building of this magnitude it was possible that two or three gentlemen might escape notice; but how they overlooked a body of thirty-five or forty men who remained in the building for upwards of an hour, is a mystery I cannot solve. I may state that the ganger referred to, and also the other labourers, had directions from me to send all gentlemen to the place of meeting. J. DOUGLASS MATHEWS, Hon. Sec.

CASEMENT WINDOWS FOR COTTAGES.

SIR,—It may be interesting to some of your readers to know that I have given the plan of opening sliding casement windows, suggested in my book on "Cottage Construction and Design," a thorough trial, since that was written, and that I find it to be certainly by far the best manner of fitting sliding casements, and appears to me entirely to get over the few little objections to this form of window, which, even with the defects of the common manner of fitting it, I have always considered to be the best form of window for cottages. The little brass fittings have been made for me, and may be procured from Messrs. Harcourt & Sons, Atlas Works, Moseley-street, Birmingham. C. W. STRICKLAND.

EFFLORESCENCE ON NEW BRICKWORK.

SIR,—Your correspondent "C. E.," in last week's issue, has really not answered the question of "T. U. & J.," of Swansea. The formation of the white frosty-looking growth on new brickwork is very annoying to the owner, architect, and builder, and any method of preventing it would, I believe, be gladly adopted. In London my experience has taught me that bricks from a field where I have inspected their make, and where neither the clay nor sand used in the manufacture has been impregnated with salt, will at times become covered over most hideously with efflorescence when built up. Has the lime in the mortar anything to do with the matter? I have scraped the stuff off the new walls and tasted it, and cannot detect any saline flavour. I wish some of your chemical readers would gather a quantity, analyse it, and communicate the result. J. KIRLTON.

SPEAKING TUBES.

WILL one of your numerous readers give me the size of tube best suited for the conveyance of messages between two offices 100 yards apart, with three or four right angles in the length? T. C.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

SIR,—At the present juncture I wish to draw the attention of the donors and subscribers to our institution, and those of our own class in particular, to the position of the institution, and I trust you will allow me to trespass so far upon your valuable space.

I have to call notice to the advertisement on the front page, convening a special meeting of the friends of the institution on Monday evening next, and trust that they will find the subject sufficiently interesting to induce their attendance in large numbers on that occasion. For some time the committee have been empowered to grant temporary relief, but from the absence of claimants such has not been done.

It is the wish of the committee that all subscribers and donors should be aware of this fact; for with the power they desire to find a use, and it is possible that, from ignorance of this fact, those who are fairly entitled to, and would be glad of, the assistance may be deterred from applying. The same committee, who for more than two years have given their time and trouble to this good work, solely for the purpose of reaching a helping hand to those of their own class whose necessities demand it, would rejoice to see that they have not laboured in vain.

Some short time since a case was brought before them of a clerk who died suddenly, leaving a widow and large family in adverse circumstances. It is an old, old story, but mournful enough to move the hearts of all acquainted with the facts. In the present case the committee are most anxious to assist the family, and somewhat alleviate their distress; and the question has arisen, "Can a present use be made of the Orphan Asylum Fund to purchase one or more life presentations in an existing asylum?" The special meeting is convened to decide that question; and I hope I do not appeal to the kind hearts of our friends in vain, to show their appreciation of the objects and labours of the committee, and give them encouragement for the future, by favouring them with their presence and opinion at this coming meeting.

I cannot close this without appealing to those who have not yet given us the powerful assistance of their names, and the encouragement of their subscriptions, to do so at once. F. T. MULLETT, Secretary.

GRINDING MONEY.

Tuckett v. *Warskitt*.—This was an action, in Whitechapel County Court, brought to recover the sum of eightpence, for "one hour's grinding money," plaintiff being a joiner, formerly employed by defendant, a builder in Cannon-street-road.

It appeared that plaintiff had entered into Mr. Warskitt's employ by the hour, and on a certain day he received an intimation that his services were no longer required, and he was paid for one hour beyond the time of working, as "grinding money." He claimed two hours, which he alleged was the custom of the trade, and right and equitable.

The defendant denied the custom, which he said he had always set his face against, and he defended the action for this insignificant sum only to protest against what he regarded as imposture. The facts of the case were admitted on both sides, and, after hearing the arguments,

The Judge said he should require a great deal of evidence to prove the existence of a custom so opposed to what he considered equitable. A man engaged himself by the hour, with the right to cease work at the end of the hour, as one of the conditions of the mode of hiring he consented to; and he had no right to claim two hours' "grinding money" when the engagement was terminated on the other side.

Judgment for defendant.

CASES UNDER METROPOLITAN BUILDING ACT.

AT the Marylebone Police-court on Friday, Mr. Benjamin Taylor answered a summons taken out against him by Mr. Henry Baker, district surveyor of St. Pancras, for that "he, the said Benjamin Taylor, having recently erected the 'Lichfield Ale Stores,' Frederick-street, Hampstead-road, which was hitherto in but one occupation (viz., that of himself), did divide the same into two or more separate tenements, each having a separate entrance and staircase, or a separate entrance from without," contrary to the 27th section of the Metropolitan Building Act.

The District Surveyor prosecuted in person; Mr. Taylor was represented by Mr. Yarde, solicitor, assisted by Mr. W. F. Potter, architect.

Mr. Yarde said this was a case never contemplated by the Act of Parliament, which intended that no building should be divided into separate buildings except by proper party walls. This case more properly came under the second clause of the 27th section as to the separation of a building into "sets of chambers or rooms tenanted by different persons," and, as the building did not exceed 3,600 square feet in area, the Act had not been infringed. Moreover, the building had never been in one occupation, as contemplated by the Act in the 3rd clause of the 27th section, but had always been in the joint occupation of Messrs. Taylor, and Parish, and Arnott, as offices or chambers.

Mr. D'Eyncourt, after a lengthened hearing, dismissed the case.

CHURCH-BUILDING NEWS.

Sutton Veny (*South Wilts*).—The new church erected here at the cost of Mrs. Everett and family has been consecrated by the Bishop of Sodor and Man, for the Bishop of Salisbury. The new church is dedicated to St. John the Evangelist. It is built in the Geometrical style, and consists of a nave and side aisles, north and south transepts, a tower supporting a spire, which rises from the junction of the cross, an entrance-porch on the south side, and a vestry on the north side. The church is built of Frome and local stone, with Bath dressings, and the roofs are of Staffordshire tiles, and are terminated with ornamental cresting. The spire, which is 151 ft. 9 in. in height, rises within the parapet of the tower. The tower has on each side two two-light windows, with quatrefoil heads, and at the four angles below the battlements are gurgoyles with ornamental iron work. At the south-east angle of the tower is a turret containing a staircase, which leads to the ringing and bell chambers. The nave is divided from the side aisles by three arches resting on circular piers, with capitals of Early Decorated architecture, from which spring transverse arches supporting the roof-timbers of the aisles. The roof of the nave is of open timber-work, the beams resting on stone corbels. The west window has five lights, with large open tracery in the head. There are six windows in the north and four in the south side, and there is a window at the west end of each aisle. There is one stained-glass window in the north aisle, which was given by Mrs. Fowle, mother-in-law of Colonel Everett

and two of her daughters. In this window is depicted one of our Lord's miracles, the healing of the sick girl. It is intended to fill all the other windows on the north side of the nave with representations of the miracles of our Saviour. In the south aisle are four windows, three of which are filled with stained glass. In the head of the easternmost window is an angel bearing a scroll, and beneath are two subjects from the parable of the Prodigal Son. The next window also has in the head an angel and scroll, and below are two subjects from the parable of the Good Samaritan. The next window has in the head an angel bearing a scroll, and beneath are two subjects from the parable of the Unjust Steward. The glass in the windows is of cathedral tint, but it is intended ultimately to fill all the windows with stained glass. The church, which is 114 ft. long, will hold about 600 people, and there are at present sittings for over 400. The whole of the internal walls are of Bath stone, and the steps throughout are of Portland stone. The church is heated with a warming apparatus, furnished by Mr. Haden, of Trowbridge. There are six bells in the tower, which were brought from the old church. The architect was Mr. J. L. Pearson, of London, and Messrs. Rogers & Booth, of Gosport, carried out their contract. Mr. A. Harrison, of Wilton, officiated as clerk of the works; and the whole of the windows were supplied by Messrs. Clayton & Bell, of London, who executed the painting of the font, the pulpit, the reredos, and the walls of the chancel. The building has cost upwards of 7,000*l*., exclusive of the churchyard, which has cost 1,000*l*.

Preston.—The foundation-stone of Emmanuel Church, Preston, has been laid by Sir Thomas G. Fernor Hesketh, bart., M.P. for Preston, in the presence of a numerous company. The proposed edifice will be built of brick interspersed with strings and bands of coloured and moulded brick, with stone weatherings and dressings. The style may be termed Geometrical Gothic, and the building will accommodate 632 on the ground-floor, and 334 in the galleries. At the west end there will be an outside porch, in which will be the steps to the church; also an inner porch or vestibule, close to which is a baptistry. There will be four entrances, exclusive of that to the vestry, which will be on the north side of the chancel. There is to be a gallery on the west end, which will accommodate about 150 persons. At the south-west corner of the church will be the tower, which is to be an approach to the west gallery, and which forms a prominent feature in the design. The tower is intended to be surmounted by four stone pinnacles at the angles, each terminating with a *fleur de lis*. The belfry, which is to be 12 ft. square inside, will contain six bells. The extreme length of the edifice over all is 125 ft. The extreme breadth over the transepts is 86 ft.; the internal breadth of the nave, 40 ft.; the chancel, 20 ft.; the transepts, 25 ft. 6 in.; the length of the nave, including the vestibule, 86 ft. 6 in.; the chancel, 27 ft.; the organ chamber, 18 ft. by 11 ft.; the height of the tower from the ground level to the top of the finial, 96 ft.,—from the foundation, 105 ft. The roof will be an open timber one, boarded diagonally on the spars. The benches will be without doors, with pitch pine ends. The chancel seats are to be of pitch pine, and have a tracery front, the ends of the benches having carved arm-rests. The church will be warmed with hot water, the heating apparatus being in a fire-proof chamber under the vestry. The architects are Messrs. Myres, Vewers, & Myres, of Preston. Mr. Bamber is the builder; and the contract signed by him stipulates that the erection shall be completed by next April. Mr. Pownall has been appointed clerk of the works; and Messrs. Clark & Charnley are the iron-founders. The work is let altogether for about 5,200*l*.

Books Received.

"NOTABLE Things of our own Time." By John Timbs, F.S.A., &c. London: Lockwood & Co. There are many notable things in each issue of Mr. Timbs's "Year-Book of Facts;" but in the book under notice he has not required to limit himself to the notable things which may turn up in any one year, the only limit being "our own time." This is a supplementary volume to the author's "Things not Generally Known," and it contains many notable and interesting things.——*Fraser's Magazine* for May (Longmans, Green, & Co.) contains a suggestive paper on Australia, in connexion with which another in it on Political Economy and Emigration may be read by those interested in such subjects. Of the working of the educational system, free from clerical trammels, there is some account in the paper on Australia.—— "Thoughts and Suggestions on Mission Chapels, Rooms, &c." By the Rev. J. Brame, M.A., organising secretary of the Additional Curates' Society. London: Skeffington. Notwithstanding the astonishing activity of church building and church restoration throughout the country, it would appear that "the Church of England is in a missionary position with regard to three-fifths of the population of the towns," so that there is a no less extraordinary want of mission chapels, of a small and inexpensive description, suitable to the poorest localities in towns; and to urge the extension of these, either by the conversion of rooms into chapels or otherwise, is one of the chief purposes of the issue of this pamphlet. The question of cost and working expenses is also treated of.——"Catalogue of the Exhibition of Portraits on Loan in the New Galleries of Art at Glasgow." This is the authenticated catalogue of the exhibition opened under the auspices of the Lord Provost, magistrates, and town council of Glasgow, in the lately-formed galleries in Sauchiehall-street. The collection consists of 392 pictures in oil, 26 in water-colours, 15 in crayons, and 26 busts or medallions. Of these, 250 have been lent by residents in Glasgow, and all the others come from other places in Scotland, except three from London. The artists are chiefly of the Scottish school, but some are English.——"The Accounts of Building Societies: a Letter to Mr. J. Tidd Pratt, F.S.A., Registrar of Friendly Societies." By Astrop Cariss. Kent & Co., Paternoster-row. The author of this pamphlet states, with reference to Liverpool building societies at least, that "under the system in general use any society can effectually conceal its true position." It is well that the particulars should be brought under Mr. Pratt's notice. This was done by Mr. Cariss in the *Leader* of February 1, 1868, and this is a reprint of the article.——The *Church Builder* for April contains accounts of several churches, as usual, with illustrations; an abstract of a paper of ours on the Sculptured Stones of co. Angus, in Scotland; and other matter of interest.—— Hardwicke's *Scientific Gossip* for May contains, as usual, much interesting matter, including papers on Vegetable Hairs, Animals that never Die, Reptiles and Fish, Remains from the Coal Measures, Spiders' Webs, &c.

Miscellanea.

CONTRACTS.—Some time ago the road trustees for the county of Berwickshire contracted with Mr. John Dickson, Galashiels, for the building of a new bridge over Bowmont Water, near Yetholm. It was a condition that the contractor was bound to uphold the bridge for one year. When finished, the work was taken off Dickson's hands by the trustees' inspector as finished, in terms of the contract. In a few days afterwards the bridge was carried away by a flood, and the trustees sued the builder for its re-erection. Proof was laid before the sheriff by both parties, and it was contended for the builder that the plan was faulty, and that he was not to blame. The sheriff has given effect to this plea.

CONSTANT WATER SUPPLY WITHOUT WASTE.—An improved system of water supply to the poor of East London has been effected through the instrumentality of the local authorities. Mr. Liddle, medical officer of health for the parishes comprised in the Whitechapel district, has made a report to the local board of works, in which he states that in the poorer parts of the district, where a few years ago there were about seventy courts badly supplied with water on the intermittent system, by means of a stand-tap only, there are at the present time fifty-three courts supplied with water direct from the main, and the inhabitants of these places can have pure water at all times of the day or night. While there is an abundance of water, it is, by the use of "water waste preventers," without waste. The New River Company and the East London Water Company have both expressed their desire to extend the system of constant supply on the single condition of provision being made against needless loss by the use of the "waste-preventing apparatus."

A SCHOOL OF ART FOR LEWES.—A Government school of art has been established at Lewes. The classes will be held in the Fitzroy Memorial Library, under the superintendence of a teacher certified by Government. Evening classes will also be held in the building of the West-street Lecture-room.

TENDERS FOR NEW ASSIZE COURTS, BRISTOL.—The tender for building the new Assize Courts, in Small-street, by Messrs. Wilkins & Son, for 11,850*l*., has been accepted, being the lowest. There were several other tenders, the next nearest being that of Mr. Foster, for 12,463*l*. The others were from 1,000*l*. to 1,200*l*. above the successful tender. The architects are Messrs. Pope & Bindon.

FALL OF A FEUDAL CASTLE.—Thurles Castle walls have suddenly given way, after standing for centuries. Four of the inhabited houses near the west gate were entombed, with all their contents, in the pile of ruins; but it appears that only a horse was killed. One side of the castle is still standing, but there is every reason, according to the *Nenagh Guardian*, to think that it is destined speedily to follow what has already fallen.

INSTITUTION OF MECHANICAL ENGINEERS.—The general meeting of the members of this institution was held on the 30th of April, in the Lecture Theatre of the Midland Institute, Birmingham, Mr. Thomas Hawksley, vice-president, in the chair. An adjourned discussion took place upon a paper read at the previous meeting, "On the Allen Engine and Governor," by Mr. Charles T. Porter, of Manchester. The next paper was a "Description of the American Dovetailing Machine," by Mr. John Robinson, of Rochdale. This machine, the invention of Mr. T. S. Armstrong, of New York, was shown at work at the recent Paris Exhibition; and it is constructed so as to cut out the dovetail joints in woodwork by means of the continuous rotation of compound circular saws of peculiar form, which finish the joints completely, without the use of any chisels or cutters.

ACCIDENTS.—An architect met his death in town recently in a very sudden and shocking manner. Mr. William Barnes, of Doric Lodge, Bromley, was on his way from the Bank by omnibus to Bromley, along with his wife, and got on the top "to oblige a lady." He had complained of giddiness, but was quite sober. He leant over to look at another passenger who was picking up some money he had let fall, and overbalanced himself, came straight down on his head, and was instantly killed by a fearful wound on his left temple, which fractured his skull.——A decorator in the employ of Messrs. Clayton & Bell, last week fell from a height of 50 ft., while doing tracery work in the interior of the dome of the New Foreign Office, Downing-street. He was picked up from the marble pavement and conveyed to the hospital, where he said he had fallen from the top of the scaffold. He expired two hours after his admission. It was found that the skull was fractured at the base from side to side, and there was a second fracture at the anterior part of the skull.

ARTISTS' BENEVOLENT FUND.—The fifty-ninth anniversary dinner of this charity was held on Saturday evening, last week, at the Freemasons' Tavern; Sir Francis Grant, president of the Royal Academy, in the chair. The report of the fund shows that since its establishment the sum of 28,689*l*. has been distributed by it in relieving the widows and orphans of artists. During the past year fifty-two widows received annuities, amounting to 847*l*., and five orphans were assisted with the sum of 23*l*. Sir Francis Grant (the chairman), in proposing the toast of "The Queen," referred to the fact that her Majesty had from her own private resources given an aggregate of not less than 3,000 guineas to the society. Her Majesty had also still further shown her interest in art by permitting her daughter, the Princess Louise, to send to the Royal Academy a bust of her brother, Prince Arthur, executed by her Royal Highness's own hand. He had no hesitation in saying that, as a work of art, this bust of the prince was beautifully executed, and it was a most admirable likeness of the young prince. The opinion which he had formed respecting this interesting work was shared by all the members of the Royal Academy to whom he had spoken on the subject. A subscription-list, including receipts of 800*l*., was read in the course of the evening.

CHURCH FOR DEAF AND DUMB.—It has been determined to erect a church in London for the deaf and dumb. The site is intended to be in the western central district.

TRAMWAYS FOR LIVERPOOL.—The select committee of the House of Commons to which the Liverpool Tramway Bill was referred has passed the preamble of the Bill. The line passes from north to south of the borough, and it is to be hoped that the Bill will pass both Houses, so that the experiment of street tramways may be fairly tried.

PAPER BELTING.—The experiment of making belting from paper has proved a success in the hands of Crane & Co., at Dalton, Mass., and the article is now used in all their own mills, and several other manufacturing establishments. The belting resembles the genuine oak-tanned leather, and serves alike well in a dry or damp atmosphere.

TESTIMONIAL TO EMPLOYERS. — On Saturday, at the Carriage Manufactory, Victoria-street, Messrs. Hooper were presented by the artisans in their employ with a vote of thanks for their liberality in sending representatives from each branch of the business to the Paris Universal Exhibition of 1867, and also presenting each person in their employ with a copy of the first published reports of artisans appointed by the council of the Society of Arts. The vote of thanks was engrossed on vellum, and richly illuminated.

RAILWAY SUPERFLUOUS LAND.—Before a railway company can, under the 127th section of the Lands Clauses Consolidation Act, sell superfluous lands, they are bound to offer them to all the owners of adjacent lands, whether owners in fee or merely lessees. The Master of the Rolls thus held, in the case of Coventry *v.* the London, Brighton, and South Coast Railway Company, which was a suit instituted against the company to restrain them from selling as superfluous lands certain pieces of land taken by the company under their Act, but which were not required for the purposes of their undertaking, without first giving to the plaintiffs the option of exercising the right of pre-emption which they claimed as adjoining owners under the 128th section of the Lands Clauses Consolidation Act, 1865.

OPENING OF DRINKING FOUNTAINS AT BRIERLEY-HILL.—Three drinking fountains have been opened at Brierley-hill. Two of them were raised by subscriptions contributed by the commissioners of the local Board of Health and the ladies of the district; the third was presented by Mr. Frederick Smith, M.A., the Earl of Dudley's principal agent. The first fountain opened stands at the police-station. The base is of Yorkshire stone, the basin of Sicilian marble. Two columns rise from the latter, and the keystone is ornamented with the head of a water god, adorned with leaves of water plants. The Ladies' Fountain is situated in a wall surrounding the premises of The Laurels. Mr. Smith's fountain is of iron, and of the pillar form. It stands over 7 ft. high, and is surmounted by two dolphins and a trident.

EXHIBITION OF ART IN LANCASHIRE. — The Marquis of Hartington, M.P., has inaugurated an exhibition of works of art and industry that has been for some months in preparation at Over Darwen. The occasion was one of great rejoicing in the neighbourhood. In Darwen the day was a general holiday, all the mills were gaily decorated with flags, and the streets were crowded with operatives in their best attire. The exhibition was opened with considerable ceremony. As many as 2,000 season tickets had been disposed of. The portion of the building allotted to the fine-art department consists of a nave, 170 ft. by 45 ft.; transept, 90 ft. by 50 ft.; four galleries for oil paintings, each 50 ft. by 22 ft.; two galleries for water-colour drawings, each 30 ft. by 22 ft.; two galleries for photographs and chromo-lithographs, each 30 ft. by 22 ft.; and an extensive gallery for engravings, 60 ft. by 45 ft. The private collections of the Duke of Devonshire, Colonel Wilson Patten, M.P., and many local residents have furnished to the exhibition some of its most interesting and valuable features. The arrangements of the exhibition have been carried out by Mr. George Hayes, artist, Manchester. A mechanical department is added to the exhibition, and a refreshment-room. Musical attractions are also provided.

DEATH OF AN ARTIST.—Mr. Meanus Massey O'Keeffe, of Cork, has died, at a comparatively early age. In the art of illuminating manuscripts after the manner of the ancient Irish he is said to have excelled. Mr. O'Keeffe's productions are described as approaching nearly to the perfection attained by the early ecclesiastics. A few friends, commiserating the helpless condition of his aged mother, now appeal to the public of his native city for contributions, however small; they will be received and acknowledged by Mr. John Mahony, at the School of Art, Cork.

INDEX TO CAMDEN SOCIETY'S VOLUMES. — An Index, of a valuable character, for literary use, is about to be published — an Index to the hundred volumes issued by the Camden Society during the last thirty years. 500*l.* have been voted for the purpose, and Mr. Henry Gough has been appointed to compile the work. The Indexes to the *Archæologia*, to the *Edinburgh* and *Quarterly Reviews*, to the *Gentleman's Magazine*, and more recently to the Scientific Papers by the Royal Society, with the Index now announced, supply a series of valuable keys to masses of literary and scientific facts.

THE BIRMINGHAM WORKHOUSE SCHOOLS.—In a letter from the Poor Law Board, read at a recent meeting of the local Guardians, the secretary of the Board says,—"With reference to the plans which you state the Guardians are prepared [with ?] for the erection of a school for boys ('on the same land [on ?] which the schools for children were intended to be erected'), at a cost not exceeding 7,500*l.*, I am directed to state that the Board are not prepared to entertain any proposal for the erection of schools that are not entirely detached from the workhouse, and placed under a separate management." A deputation, according to the local *Gazette*, has been appointed to wait upon the Board with power to "concede" the separation of the new school from the workhouse. We are glad to hear it.

TENDERS.

For a house for Mr. D. T. Morgan, at Walthamstow, Essex. Mr. John T. Bressey, architect:—

Arber	£2,478 0 0
Rivett	2,293 0 0
Mundy & Hutchinson	2,266 0 0
Piper & Wheeler	2,190 0 0
Perry & Co.	2,135 0 0
Reed	1,941 0 0

For addition to Southfields-villa, Wandsworth. Mr. G. Low, architect. Quantities not supplied:—

McRae	£400 0 0
Strong (accepted)	395 0 0

For erecting a detached residence near Rhayader, Radnorshire, for the Rev. J. Williams, including stabling and lodge. Mr. E. H. Lingen Barker, architect. Quantities supplied by Mr. W. Paice. The estimates are exclusive of excavation, water supply, and walling stone:—

Jones	£2,926 0 0
Evans	2,896 19 6
Morgan	2,837 0 0
Evans	2,614 5 0
Roberts & Son (accepted)	2,507 9 0
Mason	2,355 5 0

For alterations and repairs at No. 15, New-street, Smithfield. Mr. Robert Parris, architect:—

Dunt	£302 0 0
Hemmings	285 0 0
Sherman	285 0 0
Miles	283 0 0
Pitcher	260 0 0
West	259 0 0
Abrahams	250 0 0
Wrettom	238 0 0
Haseman	235 0 0
Blackman & Harley	230 0 0
Smith	229 0 0
Burtwell	216 0 0
White	209 0 0
Marshall	209 0 0
Taylor	205 0 0
Scofield	188 0 0
Cubitt	180 0 0
Forten	178 0 0
Mans	165 0 0
Penny	148 0 0
Warne	138 0 0

For additions and alterations to house, College-green, Gloucester, for Mrs. Hemp. Mr. H. James, architect:—

Clutterbuck (accepted)	£335 12 0

For alterations to the Devonshire Arms, Kentish Town-road, for Mr. A. Weatherly. Mr. R. Washington Hart, architect:—

Langmead & Way	£499 0 0
Lawrence & Baugh	490 0 0
Kelly, Bros.	467 0 0
Knight (accepted)	357 0 0

For alterations and additions to the Norfolk Arms, Bethnal-green, for Messrs. Truman, Hanbury, & Co. Mr. R. Washington Hart, architect:—

Gray	£740 0 0
Marr	739 0 0
Kelly, Bros.	664 0 0
Langmead & Way (accepted)	655 0 0

For House, Putney-hill, for Mr. C. Lee. Messrs. Lee, Bros., & Pain, architects:—

Aviss & Son (accepted)	£2,712 0 0

For alterations and additions to houses on South Parade, Newark, for Mr. W. Wallis. Mr. Charles Baily, architect.

Fretwell (accepted)	£210 0 0

For three houses and shops at Forest-hill, Kent. Mr. George Low, architect. Quantities supplied by Mr. F. Johnstone:—

Beeton	£2,777 0 0
Burchell	2,756 0 0
Colls & Son (accepted)	2,680 0 0

For the erection of residence on the London-road, Newark, for Mr. Charles Baily, architect:—

Bricklayers, Masons, Plasterers', &c., Work.

Fretwell (not including bricks)	£510 10 0

Carpenters and Joiners' Work.

Henderson	£36 0 0

Plumbers and Glaziers' Work.

Bousfield	147 12 0

Painters' Work.

Crossley	14 0 0

For the erection of Vicarage House, at Sutton-upon-Trent, for the Rev. A. C. Graystone. Mr. Charles Baily, architect:—

Lane	£1,645 0 0
Henderson	1,612 0 0
Mackenzie	1,598 0 0
Fretwell	1,598 0 0
Dennett & Co.	1,500 0 0
Dennett & Co. (revised and accepted)	1,350 0 0

For the erection of a new Station Inn and stable buildings, at Hildenabrough, on the new Tonbridge direct line. Messrs. Wadmore & Baker, architects. Quantities supplied:—

Whiltshire	£1,750 0 0
Payne & Balding	1,735 0 0
Wheatley	1,690 0 0
Dove	1,582 0 0
Mansfield & Price	1,550 0 0
Punnett	1,243 0 0

For the erection of Mostyn-road Wesleyan Chapel, Brixton. Mr. John Tarring, architect:—

Kirk	£9,730 0 0
Hobson	9,589 17 5
Browne & Robinson	9,325 0 0
Hill & Sons	9,175 0 0
Bracher & Son	9,095 0 0
Henshaw	8,990 0 0
Jackson & Shaw	8,865 0 0
Newman & Mann	8,766 0 0
Higgs	8,644 0 0
Thompson	8,465 0 0
Saunders	8,450 0 0
Myers & Son (accepted)	8,293 0 0

For taking down house and the erection of a pair of villas, at Bedenwell, Erith, for Mr. Creed. Mr. F. Cushing, architect:—

Thompson	£545 0 0
Chorhill	440 0 0
Archibald	396 10 0
Dowsett	387 10 0

For the erection of four cottages and public-house, at Enfield, for Mr. Ives. Mr. F. Cushing, architect:—

Holbert (accepted)	£756 0 0

For Sir John Powell's almshouses, Fulham. Mr. J. P. Seddon, architect:—

Belliham	£7,200 0 0
Hall	5,945 0 0
Grover	4,359 0 0
Williams & Co.	4,136 0 0
Muspratt	4,106 0 0
Pitts & Son	4,080 0 0
Aviss & Son	3,950 0 0
Perkins	3,640 0 0
Henderson	3,618 0 0
Wigmore (accepted)	3,398 0 0
Lacey & Co.	2,490 0 0

TO CORRESPONDENTS.

A. M. (Watson, of Glasgow).—A. H. W. (write to the honorary secretary).—E. L. G. (next week).—Mr. J.—Mr. R.—R. W. H.—J. T.—W. R.—W. & B.—S. H.—M. E. C. W.—R. & G.—S. S. & Co.—A. R.—W. S.—M. & S.—T.—C. H.—H. J. & Co.—F. W.—Sir A. C.—B. B.—W. L. S.—C. R. S.—M. M.—A. W.—C.—P. C.—E. H.—J. N.—J. K.—W. C.—J. W.

NOTE.—Architects who are unwilling (as we are) that their names should not accompany lists of tenders with which they are concerned may prevent the omission by sending lists themselves. We cannot repeat lists on the ground of such omission.

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

CHURCH, TURRET, and STABLE CLOCKS. J. W. BENSON, having erected steam-power and improved machinery for clock-making, at the Manufactory, Ludgate-hill, will be glad to furnish to clergymen, architects, and committees, Estimates and Specifications of every description of Horological Machines, especially cathedral and public clocks, chiming tunes on any number of bells. A descriptive pamphlet on Church Clocks post free for one stamp. Watch and Clock Maker by Warrant of Appointment to H.R.H. the Prince of Wales, and maker of the great clock for the Exhibition, 1862. 25, Old Bond-street, and 33 & 34, Ludgate-hill, E.C. Established 1749.